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TECHNIQUES FOR

During fiscal year 1965, some 144 naval aircrew members ejected or bailed out. Impressive or not, the statistical figure does show that the emergency parachute descent can become a reality, and knowing what to do will certainly increase the airman's chances of surviving if, and when, that reality occurs. The informed pilot or crewman who knows how to control his parachute descent and landing will be able to appraise his survival efforts more confidently than the unfortunate individual who convulsively grips his risers and is sick everytime he oscillates 15 or 20 degrees during descent.

Exiting the disabled aircraft is called escape technique, and the detailed procedures to be followed by the crewmembers can be found in the *NATOPS Manual* for the particular aircraft concerned. Once out of the crippled airplane, the airman may elect to delay his parachute opening until he falls to a more agreeable altitude of about 10,000 ft. Delayed parachute opening is properly termed freefall technique, and Section Five of the *Parachute Manual* (*NavWeps 13-5-501, 1 July 1963, Changed 1 Oct. 1965*) contains some general information on these techniques that may be of further interest.

Malfunctions

Parachuting techniques begin with the opening of the parachute. After the opening shock of the deploying parachute is felt, the airman should look up and visually check his canopy for any malfunctions. Such malfunctions are rare, but the parachutist

Nylon Letdowns

By Ronald E. Miller, HM2

should at least be familiar with them. Fatalities associated with jumping are about 1 in 50,000 jumps.

Probably the most common of these malfunctions is the "lineover," so-called because of one or more suspension lines fouling over the top of the canopy during an abnormal deployment resulting in a restriction of canopy inflation. Instead of taking the shape of an upside down bowl, the canopy resembles a giant brassiere and for that reason it is called a "mae west." As can be readily understood from the decreased area of functioning canopy, the parachutist's rate of descent will be increased. Therefore, it is imperative that the jumper ascertain which line or lines are over the top of the canopy and try to work these lines off by grasping and shaking vigorously. A "partial inversion" is similar to the lineover and is corrected in the same manner. Another kind of malfunction is the "cigarette roll." This type of failure is caused by several lines over the top of the canopy and a portion of the canopy is rolled up tight like a cigarette. Somewhat more difficult to clear, the parachutist should nevertheless make an effort to work off as many lines as possible.

Infrequently, during deployment, an errant suspension line may be whipped over the canopy surface causing a burn which weakens that particular area, and the force of the opening shock may cause this area to fail, resulting in a blown section of the canopy. Clearly, there is nothing that can be done about a hole in the canopy except to ride it out; however, depending upon the size of the hole, it may actually provide a safer descent than an undamaged canopy. The hole acts much the same as a canopy modification on a sport parachute; that is, it allows some of the trapped air inside the high pressure area of the canopy to escape. Thus the jumper will experience less oscillation and, by pulling on the rear riser (if the hole is behind) or the front riser (if the hole is on that portion of the canopy in front of him) on the same side as the direction in which he wishes to turn, he will even be able to steer his parachute.

Descent Over Land

After checking his canopy, the parachutist, if he is wearing an integrated parachute that was deployed automatically, should pull the ripcord from its pocket in order to free the container from the harness, and drop the ripcord over his left shoulder so that it hangs free behind him. Normally the releaseable ripcord housing clamp will disconnect the ripcord from the parachute container upon deployment of the parachute, but the parachutist can insure positive separation by manually pulling the ripcord from its pocket after the parachute is opened.

Time permitting, it is recommended that the rigid seat survival kit be actuated during descent and before impact, although landing with the kit intact will not cause the jumper any injury. This has been adequately demonstrated at the Naval Aerospace Recovery Facility, El Centro, California. Furthermore, tests have shown that it is nearly impossible to land on the equipment hanging from the jumper

A 28-foot flat circular parachute with a hole in the forward upper portion of the canopy.

A 26-foot conical parachute caught in a moment of oscillation.

by the 25-foot lanyard, for the equipment impacts first and the glide tendency of the parachute carries the jumper past the equipment on the ground.

Occasionally the seat kit may hang low on the airman making it difficult for him to reach the release handle. It is a simple matter to boost the seat kit up by hooking it with the back of the heels or the calf muscles and raising it to bring the release handle within reach. A smart yank upward on the handle and the seat kit separates and falls the length of the lanyard. As the bottom part of the seat kit falls away, it pulls open the valve of the CO_2 bottle and the life raft inflates with a loud hissing noise. Dangling from the parachutist by a lanyard, the entire ensemble may begin to gyrate wildly and present a threatening appearance. There is no special danger though, unless the jumper passively allows his legs to become entangled in the lanyard. To avoid this the airman need only raise his legs as the lanyard passes in front of him. As he nears the ground, usually about 1000 ft, the gyrating motion will slowly dampen out and the lanyard and equipment will begin to swing gently back and forth like a pendulum. Deploying the rigid seat survival kit during descent will not appreciably affect the tendency of the parachute canopy to oscillate.

After actuating the rigid seat survival kit, the airman should raise his visor and disconnect one side of his oxygen mask. Raising the visor of the helmet allows the jumper to look around easier to pick a possible landing spot. Disconnecting the oxygen mask allows the parachutist to breathe should he be rendered unconscious on landing. (*Before descending into trees, etc., lower the visor and loosen vice disconnect the mask.—Ed.*)

Maneuvering the Parachute

Although the standard 28-foot flat circular parachute is considered nonsteerable, it can be steered to some extent. This steering is done by manipulations of the canopy known as "slipping" and "planing." Sometimes used interchangeably, the two terms are technically different.

Slipping is accomplished by pulling down one riser and the suspension lines until the link (connector link) that connects the riser to the suspension lines is even with the jumper's chest. The 28-foot flat parachute can be slipped about 250 ft horizontally for each 1000 ft of vertical descent. A change of direction is made by slipping to the side of the desired direction. The more the lines are pulled down the faster the slip will be and the faster the descent. Therefore slipping should not be done near the ground unless it is an emergency, such as avoiding power lines. Incidentally, by using the above procedures it is impossible to collapse a fully inflated canopy regardless of how the canopy may look. It will open again normally as soon as the suspension lines are released.

Planing Maneuver

A maneuver that increases horizontal drift while slightly increasing the rate of descent, is called planing. This is done by pulling only the risers down until the connector links are about even with the jumper's nose. In planing, two risers are always used. For example, the two front risers are manipulated if forward movement is desired, or the two right risers are utilized if a planing movement to the right becomes necessary.

When slipping or planing, the risers and lines should be returned to their original positions slowly and smoothly to prevent oscillations. Slipping or planing a nonsteerable parachute involves a tremendous expenditure of energy and the parachutist would be wise to conserve his strength and maneuver his parachute as a matter of necessity rather than experimentation.

Oscillations

Oscillations are caused by the air pressure overflow spilling out from under one edge of the canopy and tilting it to one side, thus swinging the parachutist beneath it. To correct an oscillation, the parachutist should pull down hard on the high side of the canopy, then let up quickly, repeating as necessary. Often this leads to a jiggling of the risers from one side to the other until control is regained. It has been the experience of the author that oscillations are the most violent just after parachute opening (4000 ft in this case), begin decreasing at 1500 ft, finally dampening out below 1000 ft without any corrective action. Oscillations seem to diminish as the air pressure under the canopy returns to normal.

Landing

A maneuver that should be done before too much altitude is lost is turning the canopy in the same direction as the drift. Determining the direction of the drift is difficult for the inexperienced airman, but a simple trick such as putting his legs together, spreading his feet slightly, and sighting the ground between his feet will show him which way he is going. Then by pulling down one riser and holding it down, the jumper can make a slow turn until he is facing correctly.

The parachutist should have both hands on the front risers, elbows in close to the body, and look alternately from the ground to the horizon in order to better estimate his altitude. As he nears the ground, he should bring his legs together, bending the knees a little and pointing his toes slightly downward. Keeping the legs together offers the most protection for the vulnerable knee and ankle joints. The leg and back muscles should be moderately tense as they will absorb the initial impact force. On impact the drift will cause the jumper to fall forward.

As he does, he should turn his body a quarter turn, either left or right, so that he will absorb the main force of impact through the major muscle groups along the side of the body (e.g. calf, thigh, buttock, and shoulder muscles). "Stand up landings" should not be attempted by the airman. The parachute landing fall properly done will enable him to walk away from his landing without any broken bones or bad sprains.

Descent Over Water

For obvious reasons, parachute descents into water are potentially the most dangerous of landings. Consequently the more survival aids the parachutist can attend to while descending, the less groping he will have to do in the water. As brought out earlier, the jumper should visually check his canopy, free the ripcord from its pocket and drop it over his left shoulder, and then actuate his rigid seat survival kit (throw away the handle over water). He inflates his Mk-3 or Mk-4 life preserver next as it is important to enter the water with as much positive buoyancy as possible. If the water is rough the airman may have trouble getting a mouthful of air between waves. An oxygen mask that is still in place will certainly not help, so one side of the mask should be disconnected and the helmet visor raised.

Should the parachutist sight a surface vessel during his descent, he would do well to make a mental note of its direction and save his signaling devices until after water impact. Signaling during descent is a foolish waste and will not aid the rescue ship in locating the impact point of the survivor.

The parachutist should enter with both hands on

the canopy release and when his feet touch the water, he should jettison the canopy. That big white blossom that looked so friendly a few minutes ago, can literally become a shroud in the rough water. The survivor should be extremely careful not to become entangled with the canopy or suspension lines as a waterlogged canopy can drag a person under. If he does become entangled, thrashing about will only make it worse. By gathering the lines in a small bunch and using the (hook blade) shroud-line cutter to cut them, the survivor will be able to quickly free himself. On the other hand, if hopelessly snared in the canopy and lines, he should free one part of his body at a time in an orderly and deliberate manner. Great care should be taken when using sharp instruments of any kind near the flotation gear.

Canopy Deflation Pockets

The recent addition of the canopy deflation pockets to all standard Navy parachutes will lessen the danger of a water drag in high winds. If, for some reason, the parachutist is dragged and cannot release the canopy, (*for instance if canopy deflation pockets have not been installed on the parachute—Ed.*) he should grasp the top suspension lines (the bottom lines will be in the water) and pull hand over hand until the chute collapses. The jumper should remember to give the deflation pockets a chance to work first.

The body position for water entry is the same as for land (the water may only be a foot deep) even though water entries are much easier landings. Having released his canopy upon contact with the water, when the survivor bobs back up, he should pull his life raft to him by the lanyard instead of swimming after it. Once safely aboard, he may attempt to salvage a piece of the parachute canopy. This should be done cautiously, using the hook-blade knife with the canopy still in the water. . . .

Still Can Breathe

On rare occasions such as a calm, very still day, the parachute canopy may settle over the parachutist's head as he floats in the water after landing. This is no reason to panic, unnerving as the situation may appear, for the dry canopy nylon is porous and the jumper can breathe quite comfortably under it. To remove it, he should bring his arms behind his head with the palms of his hand up. Then grasping the nylon, with the elbows locked, he should swing his arms forward slapping the nylon into the water in front of him, continuing until he is free.

If time does not permit the parachutist to prepare for the water landing and he enters the water with

Making the quarter turn of the upper torso in preparation for the actual landing fall.

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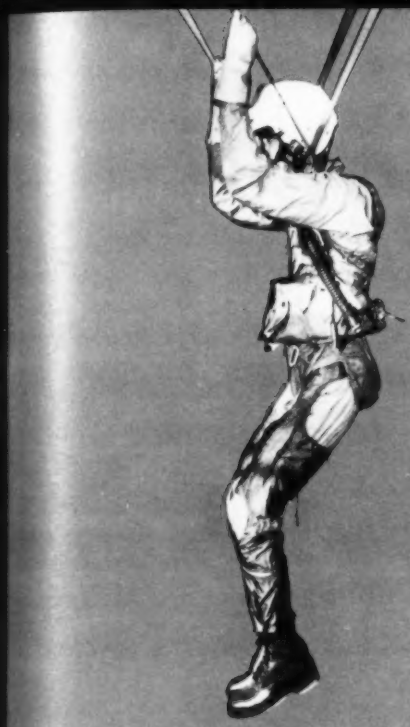

Profile view of the proper body position to assume, prior to landing, for making a parachute landing fall.

Profile view of the proper body position for making a high tension wire landing.

The parachute landing fall, showing the distribution of impact force.

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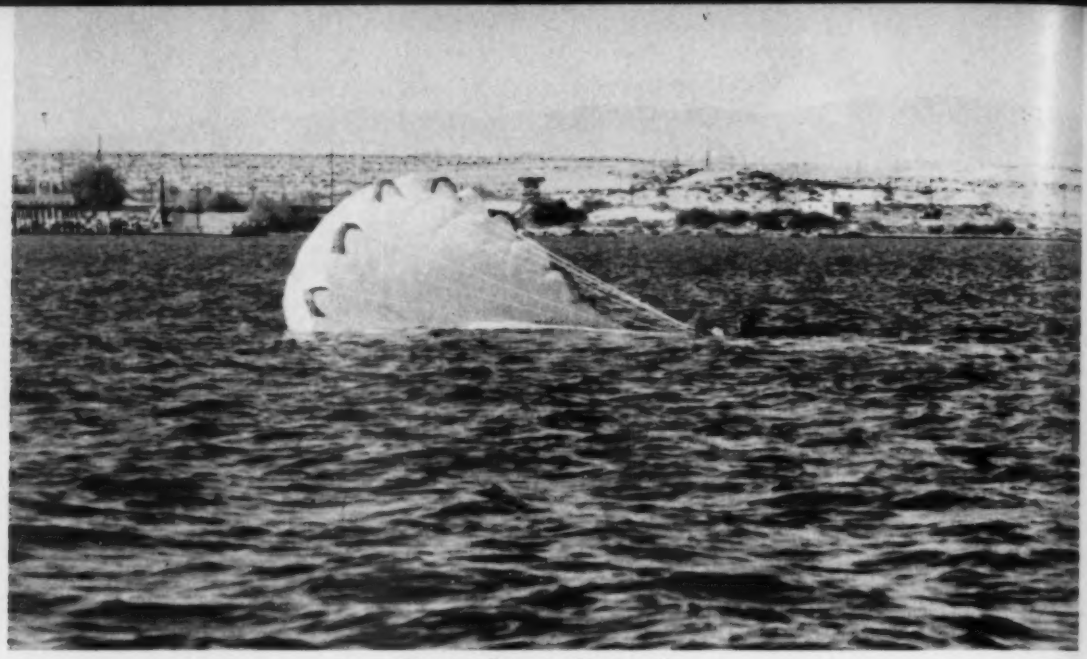

Canopy deflation pockets in action.

none of his survival gear actuated, he should inflate his personal flotation gear first—then get rid of his canopy. Next he opens his rigid seat survival kit and manually operates the CO_2 bottle that inflates the life raft. Then he boards the raft from the small end.

Unusual Landings

Probably the most common of the unusual landings in an emergency descent is the tree landing. Fortunately it is not necessarily any more dangerous than a normal ground landing. When it is apparent that the jumper is going to land in a wooded area, he should prepare himself by lowering the visor on his helmet and loosely connecting his oxygen mask so he can breathe around the edges. This gives him a protective mask. Prior to tree impact, the jumper should hold his feet and legs firmly together to protect his crotch and avoid straddling a limb. His right arm should form a barrier in front of his face, elbow high, while his right hand grasps the left side of his neck. His left upper arm should be held tightly against the left side of the body while the left hand is held over the right armpit to protect the axillary artery located in this soft body part. The head is turned to the right and the chin is buried in the right shoulder to further protect the face and throat. After entering the branches, the jumper should maintain this position until it is certain that he will not suddenly drop another few feet. If he is suspended a short distance from the ground he can operate his canopy releases and drop the remaining few feet. Otherwise the survivor had better find some way of climbing down.

High Tension Wire Landing

To say that the high tension wire landing is undesirable may be a simple understatement but such landings do happen. To prepare for such a landing the parachutist should place his feet and legs together, toes pointing downward, and extend his arms overhead, elbows straight, placing his hands inside and against the front risers. Watching his descent, the jumper should make every effort to avoid touching two wires at the same time. On contacting the wires the danger of the chute collapsing or the wires breaking and dropping the parachutist 30 ft to the ground abruptly is greater than the threat of electrocution.

Landing in a high wind will generally result in a rough ride across the ground unless the jumper anticipates the high wind and releases his canopy on landing. Should the airman be dragged, he can collapse his canopy by pulling the lines nearest the ground hand over hand toward him. Once he has collapsed the chute the parachutist should turn the apex (the hole in the center of the canopy) into the wind, or else sit on the canopy until he can disconnect his canopy releases. If injured and unable to collapse the canopy, the survivor should roll over on his back and attempt to release the canopy.

Outline of Parachuting Techniques

Procedure for Parachutes with Standard Harnesses Utilizing the Quick Ejector Snaps (NC-3; NS-3; NB-6; NB-8)

A. Descent Over Land

1. After opening, visually check canopy and lines for any malfunction.
2. Disconnect one side of oxygen mask and raise helmet visor.
3. Check drift and turn canopy so as to face in same direction.
4. Assume the position for and execute parachute landing fall as described in text.
5. For high wind landing collapse chute as described in text.

B. Descent Over Water

1. After opening, visually check canopy and lines for any malfunction.
2. Remove snaphook end of raft lanyard from pararaft kit and hook on the pararaft retainer fitting located on the waist strap of the Mk-2 life vest (*except when using a standard PK-2 raft container which should be hooked up prior to flight*). Then remove pararaft kit from kit container and let hang the full length of retainer strap. Inflate pararaft *after* water entry.
3. Disconnect one side of oxygen mask and raise visor of helmet.
4. Loosen chest strap. Using the oral inflation tube, partially inflate the Mk-2 life vest with a few puffs of air. This will give some flotation in the water while getting rid of the canopy and harness.
5. Upon water entry immediately unsnap chest strap and then leg straps. Swim away from canopy and inflate Mk-2 life vest.
6. Inflate life raft and board from small end.

Procedures for Integrated Parachutes Utilizing the MA-2 Harness with the Koch Canopy Releases. (Martin-Baker; NB-7; NB-9; NB-10)

A. Descent Over Land

1. After opening visually check canopy and lines for any malfunction.
2. Deploy rigid seat survival kit. If wearing soft kit leave intact until after landing.
3. Disconnect one side of oxygen mask and raise visor of helmet. (*When descending into trees, etc., loosen the mask and leave the helmet visor down.*)
4. Check drift and turn canopy so as to face in same direction.
5. Assume position for and execute parachute landing fall as described in text.

B. Descent Over Water

1. After opening, visually check canopy and lines for any malfunctions.
2. Deploy rigid seat survival kit. If wearing soft kit, undo left hip rocket jet fitting of seat pan and swing kit around to front, open kit and attach raft lanyard to vacated D-ring on harness lap belt. After water entry inflate raft then get rid of seat pan.
3. Inflate Mk-3 or Mk-4 life preservers during descent.
4. Disconnect one side of oxygen mask and raise visor of helmet.
5. Enter water with hands on canopy releases; as soon as contact with the water is made jettison the canopy and swim free of it.
6. Inflate raft (soft kit) manually and board from small end. Pull raft to survivor by lanyard (RSSK) and board from small end.

About the Author

Ronald E. Miller, Hospital Corpsman Second Class, started jumping July, 1962, as a member of Air Development Squadron Six, Para-rescue Team. The team is trained to aid downed airmen in the mountainous region of the Antarctic. Completing his requirement for sea duty with VX-6, HM2 Miller volunteered for duty as a test parachutist with the former Naval Parachute Facility, now known as the Naval Aerospace Recovery Facility, El Centro, Calif. A licensed FAA senior parachute rigger, HM2 Miller has made over 200 jumps for the Navy. When not jumping, he assists in researching problems in aviation survival equipment.

HOVER

OUT-OF-GROUND EFFECT

A realistic minimum operational criterion

By Calvin Alston and Lloyd Sloan
The Boeing Company Vertol Division

Ground Effect in Operations

"Ground Effect" (the additional support offered by the surface when an airfoil is very low to the surface) is most effective when the helicopter is hovering near the ground with the wheels just clearing, but becomes imperceptible when the helicopter is hovering above the surface at one rotor diameter. (see Figure 1)

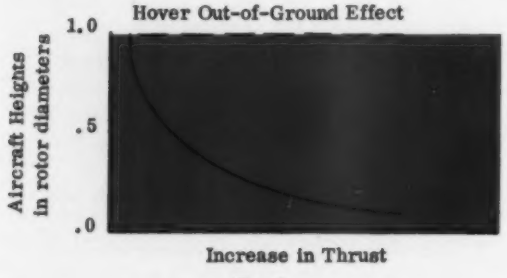

Fig. 1

In landing operations the downward momentum created by approaching the ground from cruising altitude can be substantial and the ground cushion, which is only appreciable in the last few feet of descent, may be insufficient to prevent an unintentional landing.

It is evident that when loads are slung under the helicopter, operational heights virtually eliminate the benefit of ground cushions.

Vertical Control

The special attribute of the helicopter that has assured its operational acceptance is its ability to maneuver close to the surface at zero airspeeds in order to land in confined spaces, or to deposit heavy loads with great precision.

In addition to the standard two-dimensional control, this hover capability introduces a new dimension, that of vertical control. Vertical control requires surplus power to compensate for downward momentum during landing approaches or in load-lowering operations. This can be shown as a percent of thrust required greater than that required for hovering if the helicopter gross weight remains constant.

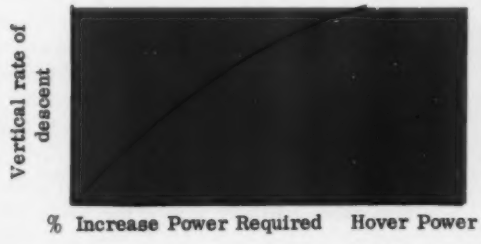

Fig. 2

Load raising for precision positioning and/or power to climb over obstacles while hovering or in a low forward speed mode will also demand excess power over that required for hovering. This can be shown as follows:

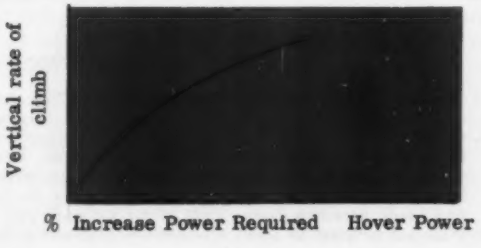

Fig. 3

Height eliminates benefit of ground cushion.

In addition to the power required for vertical control, some consideration must be given to turbulence (characteristic of confined areas) and variable wind directions with or without turbulence which could introduce adverse wind vectors during vertical ascent or descent and increase the requirements for surplus power.

Thus, even though it is often possible to operate helicopters within ground effect (especially when no external load is carried), vertical control demands *reserve* performance for which the hover out-of-ground effect criterion provides some margin.

Effect of Wind

The presence of a constant wind may tend to relieve the required margin of power for vertical control for a given mission; however, this will require good weather reporting and assurance that the wind will continue as reported throughout the mission's duration.* Further, winds may tend to aggravate the landing problems by creating turbulence or vary extensively and present adverse wind components as mentioned earlier.

High Hover Missions

Critical missions in limited warfare will often require extremely high hover—100 ft or higher can be anticipated. For example, a hilltop, which may be advantageous for communications or observation purposes, could be so heavily wooded as to prevent the landing and unloading of the necessary equipment and personnel. In Vietnam for instance, many of the suitable helicopter landing sites are anticipated by the enemy and heavily defended. Therefore, pick-up or deposit of payloads in other areas where the helicopter cannot land (and thus must hover) will enhance mission effectiveness.

Since external loads provide intelligence to the enemy, internal loads are preferred. In the tandem helicopter, with its wide c.g. travel, internal loads can be lowered at the unloading point through the large rear cargo door while the helicopter hovers above terrain unsuitable for landing.

The feasibility of this technique was demonstrated to USAF personnel at the Vertol Division plant in the spring of 1963. A Vertol Division 107 helicopter easily lifted a 4700-pound truck which was suspended from a hard point underneath the aft rotor.

Additional Operational Considerations

Operational factors present further justification for insisting on the hover-out-of-ground effect performance criterion. Additional factors which are confronted in operations, such as:

- Terrain profile conditions at the site
- Blade surface condition
- Engine deterioration
- Pilot proficiency level, and so forth,

All tend to consume the performance margins. While these factors tend to reduce the performance margins, and, are difficult to *quantify*, they are often cumulative and could easily eliminate any benefits associated with ground effect.

Conclusion

Performance for helicopters operating as vertical takeoff and landing aircraft should always be based on hover-out-of-ground effect as the very minimum operational criterion, *whether the helicopter is loaded internally or externally*. A margin of performance greater than that used for hover-out-of-ground effect should be computed for external load operations and used for mission planning.

*Accurate reporting of landing site weather in the normal helicopter remote area environment is practically impossible.

COMMAND ATTENTION

Role of the squadron commanding officer in aviation safety

By CDR Ralph M. Tucker
Commanding Officer, VS-34

The term "command attention" is very familiar to every squadron commanding officer. Directives cross his desk almost daily exhorting him to give command attention to this or that subject. Each directive bears some degree of justification. Taken singly, each appears to warrant a personal effort by the C.O., and being conscientious he will attempt to comply. Yet, taken collectively, these directives constitute a problem in the proper allocation of the skipper's time.

To solve the problem effectively, a C.O. must establish relative priorities among the various subjects competing for his attention, and regulate the amount of time he will devote to each. Then he must exercise the self-discipline necessary to stick to his plan.

The allocation of the C.O.'s time will be closely related to the goals he has set for the command. In most squadrons, the primary goal is to maintain the highest possible level of combat readiness. This goal cannot be attained unless lives and government property are safeguarded by the prevention of aircraft accidents. Thus, aviation safety will inevitably be a major objective of any fleet squadron and

is certain to receive the personal attention of the commanding officer.

It is important to keep in mind the relationship of safety and combat readiness. Standing alone, safety is not the overriding objective. Mission readiness is the primary objective. Safety, or accident prevention, is a means of attaining this objective. The point was well-made to the writer some years ago when as squadron aviation safety officer he adopted the slogan "Safety is Paramount." The C.O. let this pass for a short time, then tactfully pointed out that if safety was paramount he could stop flying, lock all the planes in the hangar and ring up a perfect safety record—though this would do little for his Mission readiness. He suggested that the slogan be changed to "Operational Safety is Paramount." This both made the point and spared the feelings of the safety officer.

The C.O. who is seeking to maintain a high level of combat readiness through safety has at his disposal great resources. The entire naval aviation safety effort, from CNO on down through the Naval Aviation Safety Center, is highly organized and functional. All needed facilities, materials, advice and assistance are available.

It is the skipper's job to take full advantage of these resources, as well as those within his command, to develop a squadron aviation safety program that will lead to accident-free flight and superior combat readiness. Four areas to which he can profitably devote attention are:

- Creation of a safety-conscious command climate
- Training and evaluation of pilots
- Reduction of maintenance error
- Responsible reporting

Creating a safety-conscious climate

The climate of a command is a reflection on the commanding officer. Law, regulations and tradition all bestow upon him the opportunity and responsibility to establish the tone of his command. If he is safety-conscious, his command will be safety-conscious. If he wears all his survival equipment, prepares his flight ahead of time, insists on a proper briefing and preflight inspection, uses the checklist, gets debriefed by the LSO, and otherwise sets high standards in his personal example, he will see these standards adopted by others. If he demonstrates a professional attitude toward accident prevention he will find others demonstrating a professional attitude. If he recognizes and praises good safety practices and condemns and corrects malpractices he will soon see others doing likewise. In a word, the actions and attitudes of the C.O. are contagious and are largely reflected in the climate of the command.

One key to unlocking a safety-conscious command climate is the selection and support of a top officer as aviation safety officer. The officer selected should be an experienced aviator and a graduate of an aviation safety school, but more important, he should be a man who thinks positively about aviation safety, who believes he can prevent aircraft accidents and has the desire and energy needed to do it. The ASO should have no other primary duties. The skipper should make it clear that he considers the ASO an extremely important member of the squadron team, and that the ASO has his whole-hearted support.

The relationship between the C. O. and the ASO should be close. I believe it can get off to a good start if the C.O. advises the ASO along the following lines:

Our basic objective is to maintain a maximum degree of readiness for prompt and sustained combat operation. Our aviation safety program helps to achieve this objective by conserving manpower and material through the prevention of aircraft accidents. Consequently, safety is one of our primary goals. As the squadron ASO you are my principal assistant in accident prevention. You have the rank and status of a department head, and your influence extends across all departments. You report directly to me. I regard your job as one of the most important in the squadron. I want you to take full advantage of your position, leave no stone unturned in your efforts to prevent accidents, and call for my personal as-

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sistance whenever you need it.

In carrying out your duties, I want you to dig deep into details of potential problem areas. For example, you should peruse all aeronautical papers received by the squadron. When you see a pertinent safety item, bring it to the attention of the proper department head. Follow-up to see that the applicable shop or section receives the information and complies. There is no connotation of meddling. You are simply doing your job.

Don't ever forget two fundamental observations about aviation safety—*Complacency* is the greatest obstacle to the prevention of accidents and *Education* is the most effective tool in the prevention of accidents. You will be constantly trying to combat complacency by educating personnel and stressing vigilance. I believe you can do this most effectively by dealing in specifics. Slogans and platitudes may have a place, but little pearls of specific information are most apt to prevent accidents. Such information should be put out continuously and relentlessly in small, absorbable quantities.

Unlike knowledge, a little bit of fear is not a dangerous thing. It is survival insurance. A little bit of fear, of course, refers only to a realistic appraisal of risks, not to action-stifling fright. A realistic appraisal of risk forestalls neglect and encourages caution. To these ends a commander may help create a safety-conscious climate by occasionally pointing out risks in an objective, unemotional way.

In seeking a safety-conscious climate, the skipper should try to involve as many people as possible. Two heads are better than one; two hundred heads are better than two; and safety is everybody's business. The skipper who can get every man in the squadron to feel responsible for safety and to work for it has done a job in motivation that will pay rich dividends.

Training and Evaluation of Pilots

Pilot error is the greatest single cause of aircraft accidents. Accidents caused by pilot error can usually be traced to lack of knowledge, lack of skill or lack of discipline. From these simple facts it follows that command attention must be focused on the task of training and evaluating pilots.

Most pilots who complete flight training and the RAG have the natural ability to become successful professional naval aviators. It is up to the skipper of a fleet squadron to continue the development of this ability until the fledgling pilot becomes a skilled all-weather aviator.

The basic tool is the standardization program. A skipper must support standardization. The NATOPS program came into being because experience showed that lack of standardization frequently led to ill-considered, *ad hoc* solutions to flight situations which were not only less than optimum but often unsatisfactory. Through the NATOPS program, we seek to identify the best way to deal with each contingency. We try to equip pilots with the knowledge they need to handle all situations in the most effective way.

No C.O. can quarrel with this logic. Forehandedness in flight, like forehandedness by the officer-of-the-deck, simply stacks the cards in favor of the operator, and improves the chances of a successful flight. Advance preparation prevents us from being at a loss when an emergency arises and helps us take prompt, effective action. This is just another example of the age-old Navy way: "Sound doctrine smartly executed."

The General Prudential Rule does apply. Standardization is not rigid inflexibility. As the NATOPS Letter of Promulgation states:

> Standardization based on professional knowledge and experience provides the basis for development of an efficient and sound operational procedure. The standardization program is not planned to stifle individual initiative but rather, it will aid the commanding officer in increasing his units' combat potential without reducing his command prestige or responsibility.

This is reason enough for any C.O. to support standardization as a means of training pilots and

preventing pilot-error accidents.

Occasionally a skipper has to restrain youthful overexuberance to forestall flathatting and prevent disaster. This must be done with finesse. An aggressive attitude in a pilot is a valuable trait, and no C.O. wants to squelch it. Still, he has to insist on respect for authority, compliance with carefully-drawn flight limitations and rules and reasonable care. To do less is to invite a tragic accident.

The evaluation of pilots goes hand-in-hand with training. It is the clear responsibility of the C.O. to monitor pilot progress, identify the borderline case and—when circumstances warrant—move to terminate the flight status of a weak or undisciplined pilot. This is not mean or inconsiderate. It is kind. It may save the taxpayer many dollars and the pilot his life.

The allies of the C.O. in evaluating pilots are the ASO, the LSO and the other experienced pilots in the squadron. These officers are constantly observing the younger pilots and their observations will carry great weight. However, the skipper must ultimately rely on his own judgment. To increase the basis for that judgment he must make a sustained effort to know his pilots—their qualifications, their records, their personalities, their abilities and their present mental state. Only on this basis can he make a sound decision.

Reduction of Maintenance Error

Many aircraft accidents and incidents are caused by errors in maintenance or servicing. Some are so simple they are hard to believe—inflight loss of hatches, panels and accessory plates due to improperly secured fasteners; loss of external stores due to faulty installation or inadvertent actuations; damage caused by

articles adrift; accidents or incidents resulting from the lack of or misuse of cotter pins, lock wires and lock nuts; and accidents due to the improper installation of parts—the infamous Murphy. All of these accidents can be prevented at the squadron level. It takes *good workmanship, professional supervision* and *effective quality control* to prevent them. It is the business of the C.O. to insure that these things are provided.

Good workmanship starts on the flight line. The character of the line tells a lot about a squadron. If the aircraft are clean and shipshape, if there is no gear adrift inside and if line servicing is completed promptly and effectively,

the maintenance character is apparent. The same character is apt to be seen throughout the maintenance organization. To encourage a good line operation the commanding officer and other pilots must pay attention to it. A word of praise or correction from a pilot —who as a pilot and an officer may appear 10 feet tall to a young plane captain—can do wonders toward spurring improvement.

A corollary to efficient line operation is safe operation of ground support equipment. To help reduce the millions of dollars lost annually to ground handling accidents, a C.O. should make certain that operators are properly screened, instructed, licensed, and supervised. He should insure that yellow equipment is properly inspected every day.

Good workmanship is likely to follow good yellow-sheet write-ups. A good write-up not only describes the gripe, it shows that the pilot cares. Safety files are full of accidents which occurred after repeated write-ups of discrepancies that were never discovered or adequately corrected. Sometimes this may be due to incomplete work, but it can also be due to a write-up so poor that it fails to define the problem. The discrepancy isn't corrected because nobody knows what it is.

Good workmanship comes when a worker takes pride in his work. This in turn comes when his work is recognized. A skipper must strive to establish procedures and working conditions within his maintenance organization which insure that the production of every worker is noticed. Motivation and pride will follow when good work is recognized and rewarded, and poor work is criticized and corrected.

Supervisory failure is a factor to some degree in almost all accidents attributable to maintenance

or servicing error. Poor use of personnel, absence of the supervisor or failure to perform a functional check often contribute to accidents. Professional supervision can eliminate these deficiencies. To get professional supervision a C.O. must raise the level of training of the supervisor, insist on adherence to approved maintenance procedures and insist on attention to duty by the supervisor.

Effective quality control is a responsibility of command. As stated in BuWeps Instruction 4700.2A

"—generating high standards of quality in a maintenance organization demands a sincere interest on the part of the commanding officer, and this must be evident to the officers and men in his command."

The rewards can be great. Successful quality control will result in good workmanship and professional supervision; and it will go far toward preventing the maintenance-error accident.

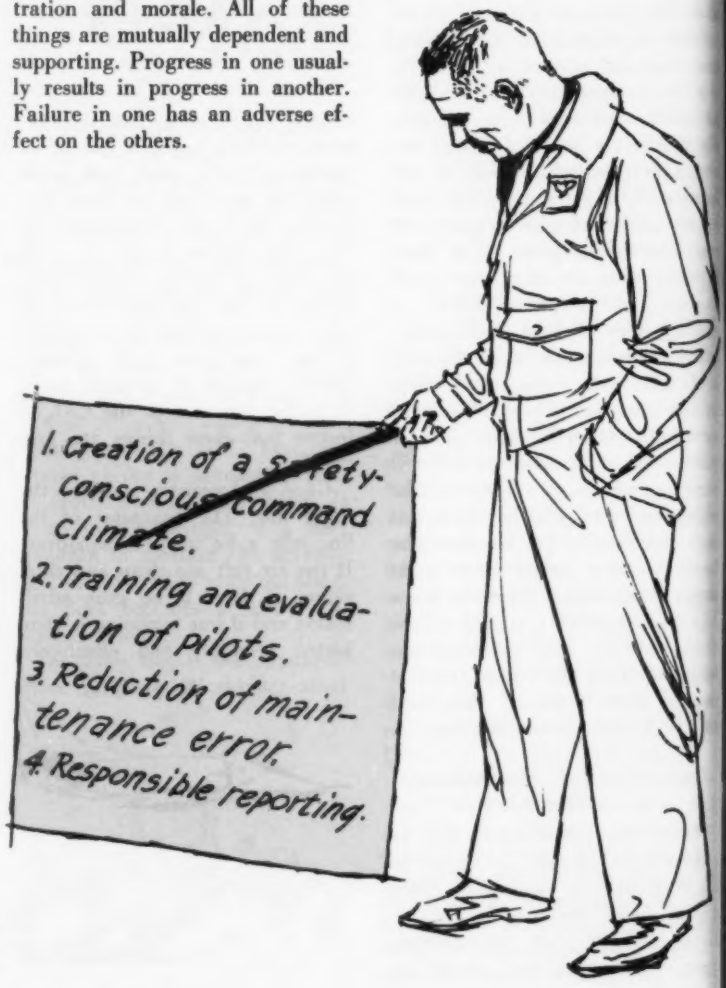
Responsible Reporting

Responsible reporting of aircraft accidents and incidents is an investment in good safety citizenship. Information obtained from these reports, particularly when they are considered collectively, leads to safety messages, modifications of operational or maintenance procedures, design changes or redesign, and other staff actions which reduce the possibility of aviation mishaps. The knowledge gained from a particular incident may unravel a mystery left by some other accident or incident, and save lives and material in the future.

It is foolish to withhold reports in order to avoid the paperwork or the mistaken view that a report will reflect discredit on the command. On the contrary, withholding a report reflects discredit. Cooperating to make the information collection program a success is simply an act of self-interest which may also be of great value to someone else.

The attention a skipper gives to safety—whether devoted to creating a safety-conscious climate, training and evaluating pilots, reducing maintenance error or responsible reporting—is interwoven with the attention he must give to other important areas, such as operations, maintenance, administration and morale. All of these things are mutually dependent and supporting. Progress in one usually results in progress in another. Failure in one has an adverse effect on the others.

Taken collectively, they add up to the challenge of command. In the end, the successful commanding officer must deal effectively with all of them. This means he must strike a harmonious balance in the apportionment of his command attention. The ability to do this effectively has often been called *leadership*.


1. Creation of a safety-conscious command climate.
2. Training and evaluation of pilots.
3. Reduction of maintenance error.
4. Responsible reporting.

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CDR Jack Reams NARTU, NAS Norfolk

Commander Reams had just applied 2300 rpm and 35 inches of MAP in preparation for climbing his S-2 out of 2500 ft when he experienced a violent pitch-up, accompanied by excessive vibration. Forward elevator control was not sufficient to counteract the nose-high attitude.

Employing procedures that had been emphasized in unit safety briefings, Commander Reams reduced power and dropped his landing gear. Power reduction allowed a near level attitude with full forward yoke. Gear extension provided about one inch of forward yoke travel for nose down maneuverability. The vibration persisted.

Commander Reams headed back toward NAS Norfolk. Enroute he was able to increase power to 2300 rpm and 35 inches of MAP without jeopardizing control of the aircraft.

The S-2 tended to pitch nose down on final approach when full flaps were selected and power was reduced for landing. Commander Reams reacted by raising his flaps and then continued his approach to a successful landing.

A tower transmission to the aircraft while it was rolling out cleared up the mystery. The fuselage Mk-4 survival raft had inadvertently deployed and was lodged in a partially inflated state around the starboard horizontal stabilizer (see photo). It remained in this position until removed by line personnel.

The cause of the raft deployment is unknown. The raft compartment door locking handle was in the locked position, both cabin and cockpit raft release handles were properly positioned and shear wired and the salt water immersion release components were intact. The raft compartment door locking bars were bent, apparently when the door was forced outward. It is assumed that the pressure which forced the door from the aircraft was provided by the expansion of the raft following the actuation of the raft inflation CO_2 bottle. The CO_2 bottle is believed to have struck the elevator and immediately torn free. It was not recovered.

It is not difficult to imagine what might have happened had not Commander Reams reacted immediately to this emergency situation exactly as he had been briefed. His performance in this instance clearly places him in the ranks of the professionals.

In the words of an Endorser, "this is a concrete example of the potential of sound procedural training in the prevention of aircraft accidents."

Again, "Well Done" Commander Reams.

Presence of Mind

Underwater know-how saves life

fe

Skin diving and scuba diving experience saved an EA-1E crewmember's life when the aircraft left the runway on landing and flipped inverted in three feet of water and mud. The crewmember, riding in the rear seat, held his breath underwater until he found an air bubble. He breathed from two more air bubbles (saving the oxygen "for possible future use") until the tail of the aircraft was raised and he was released.

(The pilot in this accident escaped from the aircraft immediately after the crash. The right front seat crewman, who was knocked unconscious at impact, drowned.*)

The rear seat crewman's description of his efforts to survive demonstrates his presence of mind in the face of great odds.

"We passed the end of the runway," he recalls, "I was aware of some mild bumping as we crossed the weeded area. Shortly prior to passing over the edge of the water, the bumping stopped and we seemed to be in a level flight attitude but losing altitude. I rapidly decided not to blow the canopy. I lowered my visor and braced myself for the contact. Why I did not blow the canopy, I don't know—perhaps it was because I knew the water was shallow.

"Contact with the water was relatively smooth but the ensuing nose-over was very hard and fast. I was aware of about two to three Gs on my body. Once inverted, the compartment filled immediately with water. Just how much water was there I could not tell at first. I released my lap belt and sank to the area of the canopy which I then blew. It moved about two inches and mud started to ooze in. I thrust my hand upward toward the seat pan in an attempt to locate the surface of the water. I felt air and my hopes soared. I tried to unfasten my parachute because I could not budge. My gloves were so slippery I accomplished nothing.

"At this point I almost panicked. Instead, I proceeded to remove my right glove and unfasten my parachute. After wriggling around I finally managed to get free of the straps but still I could not turn over because my hardhat was caught on something. I removed my helmet and attempted to get to the air, again with no luck because the parachute was floating above me. I had to shove it up under the console to make room for me to surface.

"Although undergoing severe chest convulsions, I managed to keep my mouth closed until my face was in the trapped bubble of air in the seat pan. I sat motionless for about six or eight breaths and then felt around to get my bearings. I located all of my equipment and was attempting to find the oxygen hose and controls when I heard pounding on the hull outside. I took my survival knife and pounded on the side of the aircraft. The person outside answered and I was greatly relieved.

"The oxygen appeared to work, but I shut it off for possible future use. During the ensuing minutes I located two more pockets of air and made an attempt to get to the 'Hell Hole' door—no luck. I then felt something grabbing my ankle and I reached down to find a hand. We vigorously exchanged a handshake and he departed. I then sat and waited for rescue. When the tail section of the aircraft was lifted from the water I exited the aircraft and was assisted to shore. . .

"Had it not been for my recent activities in skin and scuba diving, I am sure I would not have been able to hold my breath for as long as I did.

"The only recommendation I could make concerning equipment is: wear the oxygen mask on all takeoffs and landings around water, don't just keep it handy, *wear* it!"

*The right front seat crewman's lap belt was found unfastened. Whether or not he released it before impact cannot be determined although the injury pattern indicates that he may have.

STAMINA

Extraordinary physical stamina, courage and resourcefulness plus a fortuitous combination of circumstances enabled an A-4C pilot to survive for five hours in the water at night although injured and without survival gear.

During a teardrop approach to the carrier, the pilot misread his pressure altimeter and continued the descent until the aircraft flew into the water 21 miles from the carrier.

I was on instruments having been in and out of some low clouds at this time," the pilot recalls. "I was at 250 kts intending to dirty down at the 10NM gate. I knew I had to stop dumping somewhere after dirty down. I was making a slight right bank correcting from inbound bearing 300 degrees to the final inbound bearing 270 degrees. In my mind I was flying at 1000 ft, 250 kts, heading 330 degrees, correcting to the final inbound bearing of 270 degrees when the aircraft jumped and shook violently. The next thing I knew I was in the water, no sounds, heavy smell of JP around me and I was being tugged downward.

My first reaction was to try to pop the CO_2 cylinders in the life jacket. The jacket had been ripped open and I couldn't find the toggles. I was being dragged down and I thought to myself 'Get out at any cost or drown.' I could not find the Koch fittings; I don't even know if the risers and chute were still attached to the harness. My hand went to my survival jacket and I stripped out of it immediately, still going down. The zipper on my torso harness worked easily and I remember very definitely opening two remaining hooks and eyes.

I stepped out of the torso harness right foot first. I discovered that my left foot was hung up and I realized I had suffered a broken ankle but had no sensation of any pain. I swam to the top with a feeling of relief to be free of whatever was dragging me down. I don't know how long I was unconscious. I felt right then and there that since I was still alive and, realizing I must have flown into the water, that surely I could hang on until picked up.

I was spitting and coughing but not vomiting yet. I tried relaxing on my back but got too much sea water. I realized I still had my anti-G suit on so I unzipped it to use as a float. The connection end had been ripped off but it would hold air if I jammed my thumb far enough down the broken end of the air hose. I must have blown up the anti-G suit 50 times during the night. I knew it was somewhat of a losing fight as I could not get my thumb into the end correctly after I got cold. Just after getting the anti-G suit blown up for the first time, I saw a red light in the water and swam to it. It was the issue flashlight that I normally carry around my neck; it was on and floating part way under the water—another stroke of luck.

I could hear what I thought to be helicopter engines and blade beats and felt thankful they were searching. I was almost buzzed by an aircraft I thought to be an E-1B or C-1A, but apparently they never saw my little red light. I tried to keep pointing the flashlight at any light or noise. I had stripped off my shoes right after getting free because they slowed swimming tremendously.

AND LUCK

At the time I knew I had a broken ankle and a smashed left eye because I couldn't see through it. After many times of blowing air into the anti-G suit to rest on, I saw what I thought to be a fin standing near me in the water and was so cold that I decided to swim over and warm up. It was an external fuel tank upright in the water with perhaps a foot protruding above water. I never let go of that tank the rest of the night.

I had seen ship lights come and go. I waved my flashlight slowly each time. Although it was filling up with water it still shone brightly. Each time the lights came close I hollered as loud as possible. I had resigned myself to be very cold but alive and wait until the sun came up to use my signal mirror in the upper flight suit pocket. Then white truck lights appeared. When I saw green running lights, I gave my all to yelling and waving the flashlight and trying to send an SOS by covering the lens with my left hand. Either the button on the flashlight would not work, or my hand was too cold to push it. When a signal light cracked on me, I knew I had it made. Some very strong sailors hauled me into a small boat and it was over. . . .

On this flight I had on full gear—boots, wool socks, summer underwear, orange flight suit, anti-G suit, torso harness with life jacket, Koch fittings on top, and was wearing a new survival jacket over the torso harness. . . . The knife, quick flash, high-intensity light and white light were on the survival jacket. I had no helmet, mask or gloves on when I came to in the water. I could not see or feel any wreckage. I have no idea how I got out of the cockpit. . . During the survival phase I thought of unscrewing the red lens from the flashlight to make a brighter light but discarded the idea when I thought perhaps the bulb and all might be lost.

The pilot was in the 69° F. water for approximately five hours. At the time of rescue, his body temperature was less than 94° F. but his blood pressure and pulse rate were within normal range at the time of rescue and thereafter. He had a broken ankle, a hairline fracture of one heel, and a fracture of the bone below one eye.

The Aircraft Accident Investigation Board had this to say:

The pilot's reactions following the accident were extraordinary. His ability to properly analyze the predicament in which he found himself upon regaining consciousness beneath the water and his instant reaction resulted in his survival. The nature of the force pulling the pilot under the water cannot be determined but possibilities are:

1. Wreckage of the aircraft.
2. Weight of seat, seat pan and parachute.
3. The parachute deployed underwater preventing the pilot from ascending to the surface.

In any event, the proper response in a controlled manner in the face of severe injuries enabled the pilot to free himself from the entangled torso harness and swim to the surface. Physical stamina and mental and emotional discipline played a major role in the escape. . . . The pilot's use of the anti-G suit for flotation was proper. Finding the red flashlight still in a working condition and the external fuel tank floating intact were fantastic strokes of luck.

Locked Yoke

Shortly after takeoff for an eight-hour patrol, while attempting a right turn to climb on course, the pilot of an HU-16E discovered that his yoke would not rotate beyond the neutral postition. Using rudder alone, he managed to complete a right turn and entered downwind while continuing to gain altitude with climb power.

On downwind the copilot notified the tower of the control problem and then summoned the plane captain to the cockpit to lend a hand. Since the binding seemed to be in the copilot's yoke, the PC removed an adjacent deck plate for a closer inspection but was unable to find the cause of the problem.

At this point the pilots contemplated the use of force to free the yoke but eventually decided to leave the yoke in the neutral position and rely exclusively on rudders for turns and runway lineup.

While experimenting cautiously, the pilot had determined that the yoke would move to the left, but he had not moved it more than five degrees in that direction.

The turn to final, runway lineup and landing were accomplished successfully with the use of rudders alone. After rollout the pilot secured the engines, leaving the yoke in the neutral position.

Upon entering the cockpit, the maintenance chief attempted to move the yoke to the right, found he could not and then moved it to the left. It locked at about 30 degrees of left travel and would not move back to the right from this position. He then moved the yoke further left and it locked again at 60 degrees, and again would not move back to the right. He then moved the yoke full throw to the left, where it locked in a position that was unmovable by physical effort.

Later, during a thorough inspection of the copilot's yoke, a spacer was found wedged in the yoke sprocket. Its position was such that it acted like a ratchet, permitting yoke rotation to the left, but preventing rotation to the right. Had the yoke been rotated a significant distance to the left while airborne, it would have been impossible to have returned it to the neutral position. The outcome would probably have been an uncontrolled collision with the ground.

Previously, during an improper disassembly of the yoke, the spacer had fallen from the yoke shaft into the aileron controls. The normal position of this spacer on the shaft was such that its absence was not noticed when the shaft was reassembled. Thus it rode harmlessly in the aileron controls through several flights until finally working its way into the chain and sprocket assembly. Since the controls had functioned normally during ground checks, this final movement of the spacer must have occurred during or immediately after takeoff.

The decision to not experiment extensively with the yoke while airborne was probably instrumental in saving the aircraft and its crew. The outcome of this incident is certainly a strong argument against extensive airborne

ANYMOUSE

The purpose of an Anymouse (anonymous) Report is to help detect or prevent a potentially dangerous situation. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Self-mailing Anymouse forms are available in readyrooms and line shacks or through your ASO. All reports are reviewed for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

experimentation in cases of control malfunctions.

"If you have enough control to effect a landing," says anymouse, "do it and let the maintenance personnel conduct the necessary experiments." However, in situations where control surfaces have been damaged and the pilot is unsure of their aerodynamic response in the landing configuration, a climb to altitude for some experimentation would be in order.

ARC-27 Dial Problem?

I left NAS Desert in an A-4 *Skyhawk* after dark in light rain and one mile visibility for NAS Halfway. At FL 330 Los Angeles Center passed me to Denver Center with a frequency change. As I manually dialed the frequency on my ARC-27 the second ring of the manual tuner broke into three pieces. I had no idea what frequency I was on.

The situation was not difficult because the weather had turned VFR and my navaids were good. The flight terminated with a tacan approach to a VFR landing.

Had the weather remained IFR, or had my navaids failed, things may have become interesting rather quickly.

While using the ARC-27 over a four-year flying period, this is the third time a manual frequency dial has broken while I was attempting to dial a frequency. I checked with the Electric Shop Chief and he indicated that these dials fail often. They seem to be made of a fragile plastic.

With the modern technology in plastics the Navy should be able to find a dial that would not break so easily. It might cost a few pennies more, but it might also save a million dollar aircraft and pilot some dark IFR night.

This was an agenda item during the recent 1966 Navy-Douglas Safety Symposium. Action of the highest priority was recommended to equip A-4s with a manual UHF readout on the glare shield. BuWeps is considering methods of incorporating the ARC-51 control box in A-4B/C/E aircraft with a remote frequency indicator to operate with the ARC-27 portion of ASQ-17B integrated electronics central. Until such time as the indicator is available it was recommended that BuWeps request an ECP for installation of the remote frequency indicator.—Headmouse

Don't Assume Anything

The pilot gave the chocks-out signal but the crew chief missed it. A mechanic had called him under the wheelwell to check a suspected hydraulic leak. The pilot saw the crew chief go under the aircraft and assumed that he had gone to pull the chocks. When the crew chief reappeared from under the wheelwell, the pilot assumed that the chocks had been pulled. . . so he added power to taxi.

The mechanic, still out of sight of the cockpit, was trying frantically to pull the chocks. Then the aircraft jumped over the chocks and rolled over the mechanic's foot. Something caught his jacket and he was knocked to the ramp where the left main wheel struck him a glancing blow. He received multiple abrasions, broken ribs and a fractured toe.

Ground operation and aircraft movement signals are most important. They should be clearly understood by all parties concerned before any operation is initiated. Wait for the proper signal.

Don't *assume anything.*

—Jan 66 5th AF Safety News.

Editor's Footnote—

For those of you interested in a do-it-yourself project; before using the word ASSUME, remember it should be hyphenated into 3 distinct syllables —u.— and when thought of in this light, improper usage of the word can make one of U and me.

Reader Questions Headmouse Answers

Have you a question? Send it to Headmouse, U. S. Naval Aviation Safety Center, Norfolk, Virginia 23511. He'll do his best to get you and other readers the answer.

Wire Practice & Terminology

Dear Headmouse:

Some months ago APPROACH carried an article concerning the uses and specifications of the various types of wire commonly utilized in aviation activities in the fleet. The article further divided into categories the types of wire that are to be used for safetying parts which tend to loosen in flight, as opposed to the wire that is simply placed on the equipment to form a seal or to prevent inadvertent switch operation.

Since our copy has disappeared, it is requested that if possible, a reprint be forwarded for use in our maintenance program. If reprints are not available, I would appreciate information concerning the appropriate specifications for wire usage.

F. W. WOOD, LCDR
ASO, VP-17

▶ The article was in the December 1964 issue, pages 22 and 23. A copy is underway. Wiring specifications are governed mainly by MS Standard 33540. Since the publication of the article BuWeps assigned the Naval Engineering Center, Philadelphia a Weptask to make necessary changes to MS-33540 that will clarify and define wire usage.

NAEC advised the Aeronautical Standards Group on 30 Nov. 1965 to proceed with the preparation of revisions as follows:

Inconel (uncoated)—This will be for all general lockwiring purposes. Lockwiring is the application of wire to prevent relative movement of structural or other critical components subjected to vibration, tension, torque. . . . .

Copper, Cadmium Plated and Dyed Yellow—This will be for shear and seal wiring applications only. Shear applications are those where it is necessary to purposely break or shear the wire to permit operation or actuation of emergency devices. Seal applications are those where the wire is used with a lead seal to prevent tampering or use of a device without indication.

Aluminum-Alloy Alclad 5056, Anodized and Dyed Blue—This will be used exclusively for lockwiring magnesium parts.

Note: All of these wires are visually identifiable by the color of the finish for each: inconel (natural), copper(yellow) and aluminum (blue).

The term "safety wire" shall be discontinued in favor of the term "lock wire" to distinguish between seal and shear wire and lock wire, all of which may serve safety purposes. Therefore, throughout MS-33540 change words "safety wire" to read "lock wire."

Other pertinent changes read: copper wire (0.20 inch diameter) or aluminum wire (0.31 inch diameter) or other similar wire called for in specific technical orders may be used as seals on equipment or nonstructural components such as first-aid kits, small portable fire extinguishers, emergency valves or oxygen valves or regulators, ... to indicate whether these items have been tampered with or have been used.

Use single wire method to secure emergency devices. Make sure that wire is so installed that it can easily be broken when required in an emergency situation. For securing emergency devices where it is necessary to break the wire quickly, use aluminum or copper wire.

Very resp'y,

Headmouse

Glue Jag

Dear Headmouse:

One of our pilots had a rather unusual experience that should be passed on.

This pilot filed and departed on an IFR round robin. Climbing past 10,000 ft his eyes started watering and stinging. His climb continued leveling off at FL 310 (18,000 cabin). He noticed that he was making mistakes but seemed unable to determine just how to correct them. He became slightly confused and disoriented. After personal efforts to improve his performance had failed, the pilot requested and got a lower altitude, FL 240. After arriving over Cherry Point VFR, he cancelled his instruments and after determining that his performance had improved made an uneventful landing. Throughout this flight the only abnormal feeling noticed by the pilot was being tired.

Investigation revealed, not a contaminated oxygen system, but the mask seal was the culprit. The mask had been cleaned, inspected, and the seal replaced six days before this flight. A general purpose type III adhesive had been used. After six days of drying, this compound still gave off toxic fumes and, in this case, enough to give this pilot a mild jag. Aftereffects also reflected considerable absorption of these toxic fumes.

MOUSE

▶ Your letter pretty well covers the situation. Technicians working on oxygen masks (and helmets, too) should take time and care to use the prescribed adhesives.

Very resp'y,

Headmouse

Flight Boot

Dear Headmouse:

After using the Navy high top steel-toed leather flying boots for about two years under many varied conditions, I find that they are satisfactory under most conditions but utterly fail when called on for use as a survival boot. When used in mud, snow, ice or any other slippery type surface, the present sole doesn't produce sufficient traction to support a person upright. I feel that a rubber lugged sole and heel construction would more adequately protect the wearer and allow the boot to be truly a survival flight shoe. Also, some insulation would protect those fliers forced to bail out/eject over snow-covered terrain.

S. L. HAYWARD, LT
CCA UNIT 34 NAS SEATTLE

▶ There is a new Mil-Spec near completion for a new flight boot that will include a new design for a traction, oil resistant, slip-resistant neo-lite sole. There's very little change in the upper part of the boot. Commander Naval Air Force, U. S. Pacific Fleet is in the process of procuring 200 pair for additional evaluation.

Very resp'y,

Headmouse

Pistols With Tracers

Dear Headmouse:

In reference to "Wyatt Earp's" question in the January, 1966 APPROACH (Headmouse, p. 23), I'd say read the *NATOPS Manual* again. The manual on my desk for the UH-34D/G/J, page 2-3/2-4, paragraph on Personal Flying Equipment, item 14 expands quite adequately on *OpNav Instruction 3710.7* series. Additionally, it seems hard to visualize a squadron so complacent from the C.O. on down that they could ridicule anyone for being prepared.

A further item of interest overlooked by many units is the *Marine Corps Table of Organization* which lists the .38 pistol as the weapon to be carried by all aviation personnel, regardless of rank, flying as crew members. Many squadrons prepare their pilots adequately but overlook the crew members.

A vigorous NATOPS program seems lacking here and "Earp" might be just the guy to get it going.

C. G. GERALD, CAPT, USMC
2ND MAW NATOPS EVALUATOR FOR HELICOPTERS

▶ You're absolutely right. Both the *OpNav Instruction 3710.7B* which we cited in our answer to "Wyatt" *and* the *UC-34D/G/J NATOPS Manual* require the pistol with tracers or an approved substitute under the conditions stated.

Very resp'y,

Headmouse

Design Standards for Visual Landing Aids

A recent inquiry by an operations type for guidelines to construct lighted windsocks suggests publicizing the source of such information.

NavWeps 51-50AAA-1 of April 1965, Visual Landing Aids, Design Standards, provides information for installation, operation and maintaining visual landing aids systems currently used by the Navy ashore and afloat.

In the case of wind cones, specifications are outlined for 8 and 12-foot cones. The standards for visual aids are not intended to direct implementation but to establish uniformity when implementation is undertaken. These were formulated by BuWeps in the interest of safety, regularity and efficiency of aircraft operations. The specifications are mandatory and any deviation from them must be authorized by BuWeps.

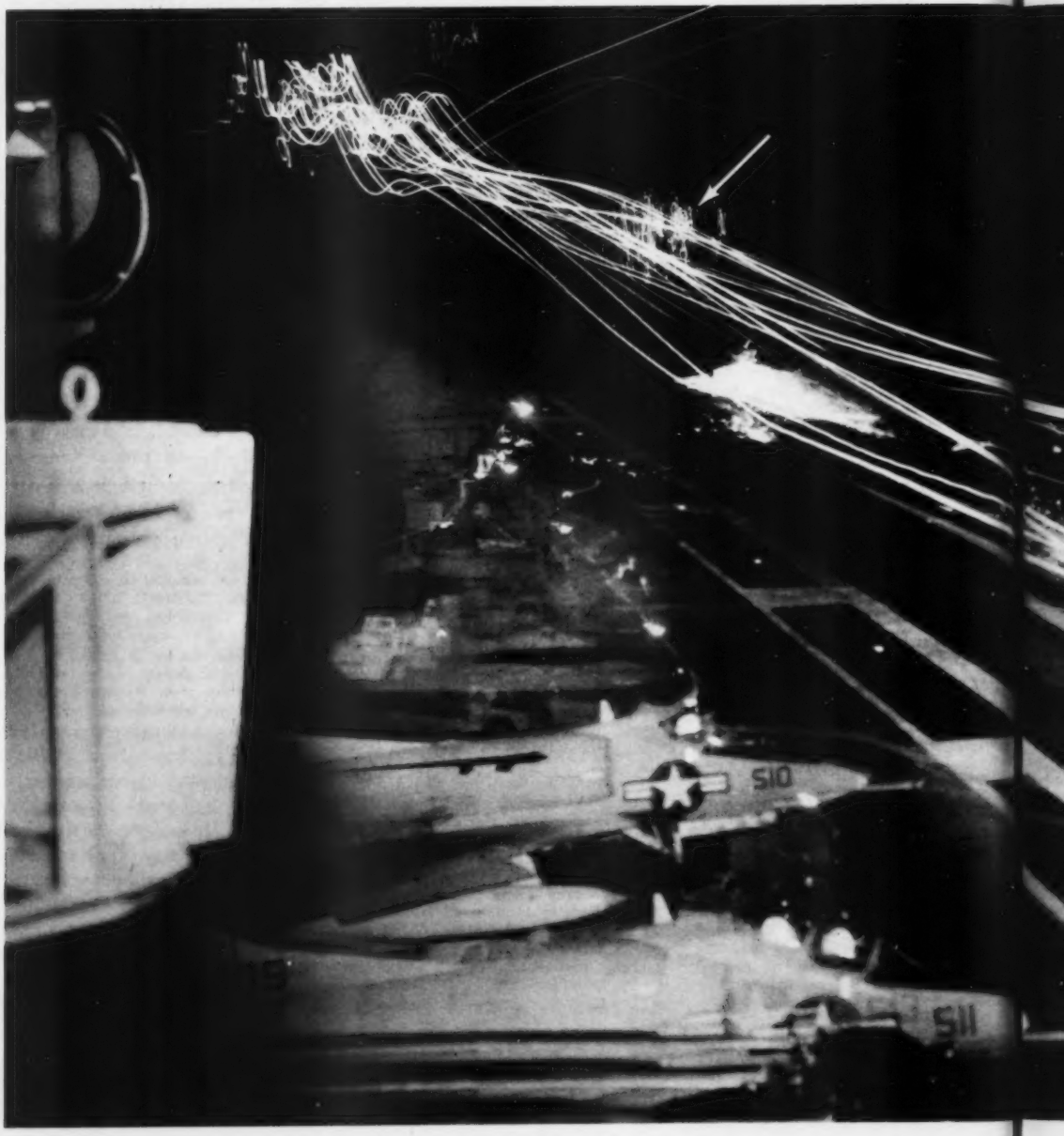
Other items covered by the manual include CVA and CVS lighting systems, lighting control systems, flight deck markings, optical landing systems, pilot-LSO plat system, flight deck lighting system; LPH flight deck lighting and controls, LPH flight deck markings; nonaviation vessels and Dash ships; visual landing aids lamp list; airfield lighting systems and controls, airfield markings, airfield optical landing systems, simulated flight decks, heliport visual landing aids.

Landbased visual landing aid components, airfield zoning and clearance requirements, seadrome visual landing aids and components. Also included are lists of manufacturer's code numbers, reference drawings, reference specifications and reference publications, Federal Stock Numbers and a host of illustrations.

NavWeps 51-50AAAA-1 should be in the reference library of every operations office.

Safety is the art of reducing risks to the least possible chance of occurrence.

'Power! Power! Power!'



appr Post

What began as a routine experiment for some unusual photo effects developed into a portrayal of the final phases of several night carrier approaches, including one which terminated in a ramp strike.

This remarkable time exposure recorded the night flight of Navy 510 from a few moments prior to launch until it later struck the ramp. As a result of intentional multiple exposures on the same negative by B. L. Kleckner, PH-3, the pilot of 510 appears in the foreground as if witnessing the burst of light on the ramp, his own accident.

Bravo damage resulted on impact when both the A-4's main mounts and hook were carried away. Navy 510 was bingoed to the beach where recovery on a foamed runway was effected with no injury.

Twenty ramp strike mishaps occurred in fiscal year 1965. On six of these, the LSO did not try to wave the aircraft off. On the other hand, frantic *"Power"* calls were given in the majority of the ramp strikes, the above accident no exception.

In fiscal year 1966, through 6 February, there have been 11 ramp strike accidents and 2 ramps strike incidents reported. In these also, there were many "Power" calls and few waveoffs given.

Why does an LSO need to give a frantic "Power" call? Obviously because an unsafe condition has developed. When an unsafe condition is evident, there is really only one best way out for all concerned, and that is a *waveoff!*

For further testimony to the LSO's constant reminder "Don't accept a low ball," see the inside back cover.

The oscillating path of the light sources on the landing aircraft and the plane guard destroyer (see arrow) result from the motion of the carrier since the camera was fixed thereto. As the aircraft approaches the deck, the light path becomes more nearly straight because of the fast rate of travel from left to right across the picture. Hook-to-deck contact, arresting gear extension/retractions, etc., are all contributors of incidental light. The approach on which the ramp strike occurred shows early indications of being low. Pitching deck was not a causal factor in this accident.

Short Snorts

If safety can be a disease, let's start an epidemic.

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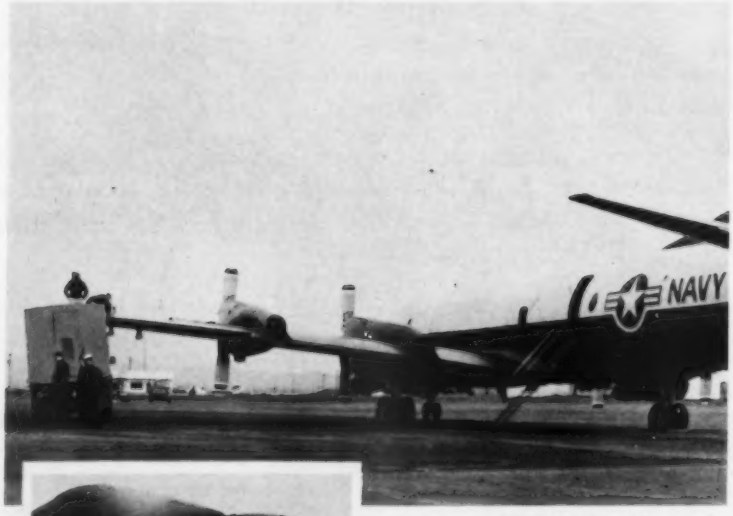


Inside job—Truck driver thought he had overhead clearance. . .

. . . he didn't. Outside help would have helped prevent this mishap.

Low Overhead

The truck driver veered right to put additional space between himself and three electronics vans, which were partially blocking his intended path between a hangar, and the adjacent ramp area where a P-3 was parked.

He saw the *Orion* wingtip ahead on his new course but didn't change direction because it looked to him like his 1½-ton covered rig would clear with no trouble.

Unfortunately it didn't. At about 10 mph he hit the port wing of the aircraft.

The sad thing about this accident was that there was ample space between the wing and the electronics vans for the truck to pass. It was daytime and visibility was good.

The driver's poor judgment and complacency in driving a high-top rig beneath a wing, without checking clearance or having someone outside to do it for him, may be partially explained by the fact that he was attached to a non-aviation unit.

It's a safe bet to surmise, that most truck drivers on air stations will eventually drive through or adjacent to areas where aircraft are parked. For this reason, during Navy driver-training each student should at least be taught the basic precautions necessary when approaching or circumventing an airplane.

Point to Ponder

No one gets ready for an emergency in a moment. What a person does in an emergency is determined by what he has been regularly doing for a long time.

—National Safety Council

Preflight Pays

The crew of an SH-34J carefully preflighted their anti-exposure suits before manning the aircraft. One of the crewmen changed his suit when he discovered a tear.

The helicopter's flight terminated in a ditching. All four crew-

members escaped and, between five and 10 minutes after the accident, were rescued from the 45° water unharmed.

Attention to details pays off—especially in survival equipment inspection.

Safety

When safety is the topic,
Most Folks sit and sigh,
They barely listen to the rules
Meant for the other guy.
Safety is for knuckleheads
Who go around in a daze,
But you are always wide awake
And never reach that phase.
Who keeps on taking chances
After going scot-free once,
But never heeds the warning?
Not you—the other dunce.
We all know the rules of safety
So, why bother to discuss
Rules that apply to the other guy
But never apply to us.
The moral of this story,
As you can plainly see:
To me, you are the other guy,
To you, that guy is me.

—*Atlantic Coastline*

Peeled Nose

An E-1B was spotted, unmanned, abeam the forward island structure facing the bow.

An A-4 spare, spotted just forward of the island facing port, was taxied out crossdeck to port and given a 90-degree right turn when about 15 ft up the deck from the *Fudd*.

Upon completing the turn, the A-4 was halted for almost ½ minute before being taxied onto the No. 1 catapult. During this time the heat and blast of its engine was hitting directly on the nose and forward fuselage of the E-1B (see photo for damage).

Normally, if the A-4 spare is needed to complete the launch it is taxied out of its spot forward of the island after the No. 1 catapult has been fired and after the jet blast deflector has been lowered.

A-4's heat and jet blast blistered *Willy Fudd*'s nose.

In this mishap the Taxi Director taxied the A-4 out prematurely.

Flight Deck Fatigue

Fatigue during extended periods of air operations is not solely confined to the cockpit. Flight deck personnel are exceptionally vulnerable due to their particular working environment.

Speed brake and fuselage damage caused by blast deflectors.

An A-3B was being taxied from its spot at the forward end of the island onto the port cat for a night launch. As the aircraft maneuvered onto the cat, the outer blast deflectors were raised and the inboard blast deflector contacted the aft portion of the aircraft's starboard speed brake, tearing it extensively. The brake needed replacing and the aft fuselage area below the brake was ripped and stringers broken.

A weary deck edge operator raised the blast deflectors before the aircraft was taxied far enough forward onto the catapult to be clear of the deflectors.

Precautionary Approach

As the *Crusader* descended through 4000 ft at 450 kts with the cruise droop down there was a loud explosion and the aircraft rolled uncontrollably 120 degrees to the left. The droop indicator "barberpoled" and the wing incident light illuminated.

The pilot righted the aircraft and climbed to 10,000 ft. Noting that the utility hydraulic pressure had dropped to zero and that the portside hydraulic cruise droop was gone, the pilot slowed to 200 kts, blew the gear down, dropped the hook and conducted a slow flight check.

A precautionary approach was made to 11,200-foot runway at 185 kts with the wing down. The engine was secured on touchdown at 180 kts and the midfield arresting gear was engaged at 160 kts.

Investigation revealed that the threads of the locknuts for six of the upper and lower bolts supporting the droop actuator fitting assemblies had sheared. The remaining ten supporting bolts and locknuts were intact but four of the bolts didn't protrude through the locknuts the required minimum of 1/32" (NavWeps 01-1A-8, Section V).

This may have prevented a positive lock, enabling the bolts to loosen in the droop actuator fitting assemblies to the point where they sheared. The fittings had previously been X-rayed and no fatigue cracks had been found.

Accidents have no holidays, so be careful.

In the wake

of the heavies

are miniature

twin tornadoes that

can spell trouble. . .

beware of

Wake Turbulence

For years turbulence generated by aircraft was attributed to prop wash. The prop wash behind other aircraft caused some pretty rough rides, go-arounds, some accidents and was the subject of a lot of hangar flying.

With the advent of the large jet transports and helicopters, the dangers associated with vortex turbulence were greatly emphasized and the so-called prop wash problems enlarged to include jet wash and helicopter down wash turbulence. By this time, however, the problems associated with aircraft wake turbulence had been broken down into two categories —thrust stream turbulence and wing-tip vortices.

What was once thought to be prop wash was in fact vortex turbulence. Prop/jet wash, correctly termed thrust stream turbulence, can be a hazard to aircraft operating on the ground and pilots should take normal precautions to avoid taxiing closely behind larger aircraft that are making an engine runup or if in a large aircraft, avoid running up when smaller aircraft are close behind. At distances of 400-500 ft, prop or jet wash normally will not constitute a serious hazard to other aircraft operating on the ground. Also, it should not be a hazard to aircraft in flight except possibly in the case of a takeoff or landing in the immediate area of an aircraft making a ground runup.

A vortex core is the center of a trailing mass of disturbed air created by the wing of an aircraft as it produces lift. An aircraft creates two such vortices with rotational air movement. A lift-producing air foil leaves a continuous sheet of unstable air behind the trailing edge. Spillage about the wing tips creates two distinct vortices. This rollup process normally occurs at a distance of about two to four times the wing or rotor span of the aircraft—about 200 to 600 ft behind the aircraft. If visible, formation of the vortex cores would appear approximately as shown in Fig. 1.

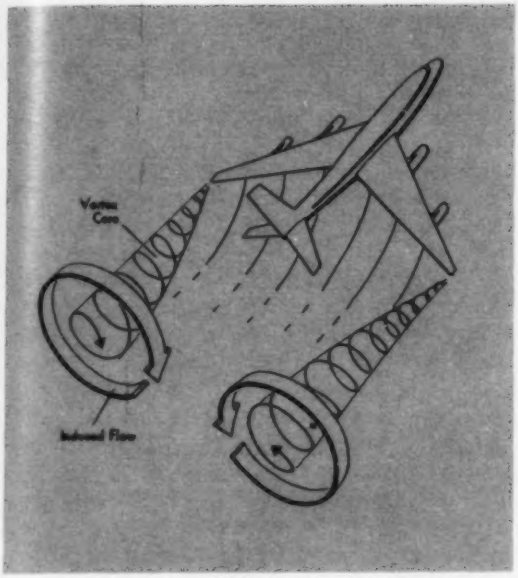


Fig. 1
Example of wing-tip vortices initial formation. (Once formed, vortices extend and may be hazardous for an undetermined distance behind the generating aircraft.)

Vortices generated by the rotors of a helicopter trail along the track behind the aircraft in the same manner as those generated by a fixed wing aircraft. These vortices have the same internal air circulation as those generated by fixed wing aircraft and have the same effect upon other aircraft.

When an air foil creates lift, energy proportional to the weight being lifted is transmitted to the mass of air. Generally, the greater the lift the greater the energy transmitted to the air mass in the form of turbulence. This turbulence is directly related to the weight, wing span and speed of the aircraft. *The heavier and slower the aircraft the greater the intensity of the air circulation in the vortex cores.* Thus, it can be seen that large modern transport aircraft will create vortices having maximum rotational velocities during takeoff and landing at or near maximum gross weights.

There is no current practical knowledge that can be used as a yardstick to accurately measure the period of time vortices will be a hazard to other aircraft. Studies have been conducted and measurements taken of the size of vortices and velocity of the air within them three minutes after passage of large aircraft. Pilots have reported what they believed to be vortex turbulence five minutes and more after passage of another aircraft. No practical rule exists involving a time interval for one aircraft passing behind another that will assure avoidance of the vortices generated by the first. However, other methods of avoiding the hazards associated with aircraft vortices are known and can be applied by pilots.

"Why should I avoid flying in or through the vortex turbulence behind large aircraft?" is a question that a pilot might ask if accustomed only to the turbulence created by light single-or twin-engine aircraft. Perhaps the best answer, and the most impressive one, is that the aerodynamic forces applied upon the light aircraft by the circulation of air in the vortices, plus the pilot's attempt to counteract it could result in the airframe design limits being exceeded and possibly structural failure.

The pilot who has always been able to control his aircraft through any prop wash that he has previously encountered may mean nothing, because the forces he encounters behind a large heavily loaded aircraft could exceed the control capability of his aircraft. A roll, descent, or combination of the two could continue even though full control travel or power is applied. *The forces of the air in wing-tip vortices may well exceed the aileron control capability or the climb rate of some aircraft.* For those who want figures, the air in a vortex core can produce a roll rate of about 80 degrees per second, which is about twice the role rate capability of some light aircraft when using full aileron deflection. If the light aircraft stayed directly between the center of the vortex cores from a heavy jet transport it could encounter a downward flow of air of about 1500 ft per minute. A light aircraft with a continued climb capability of 1000 to 1200 ft per minute could go only in one direction—down. Caught in such a position the pilot who altered his course could get caught by roll forces or a combination of downward and roll forces. These forces have been sufficient to cause aircraft to do one or more complete rolls, to force them into the ground and in some instances a combination of the two actions.

The best way of avoiding the vortices hazard is to know where they are most likely to be encountered and act accordingly. Since vortices are not formed until lift is produced, they will not be generated by an aircraft taking off until just before lift off—at the point where rotation is made. Vortices cease to be generated by a landing aircraft when its wing ceases to produce lift—after it has actually landed. It is worthy of note that a large aircraft could have taken off and be out of sight, or landed and be on the ramp and the vortex turbulence still be present near the runway.

Another factor to remember is the vertical and lateral movements of vortices. Vortices generated more than 100 ft above the surface will drop almost vertically in a no-wind condition *until reaching a height equal to about one-half the wing span of the generating aircraft.* At that point they start to curve outward and spread laterally away from the track of the aircraft. Remember that both the vertical and lateral movements of the vortex cores will be affected by and move with the encompassing air mass. A crosswind will displace the vortices from the vertical in their downward travel and effect the lateral rate of travel. A crosswind component of about 4 to 6 kts, depending upon the lateral rate of vortex travel, can cause one core to remain laterally stationary over a line on the surface while the opposite core travels at its own lateral rate plus that of the effective crosswind.

How to Avoid Wake Turbulence

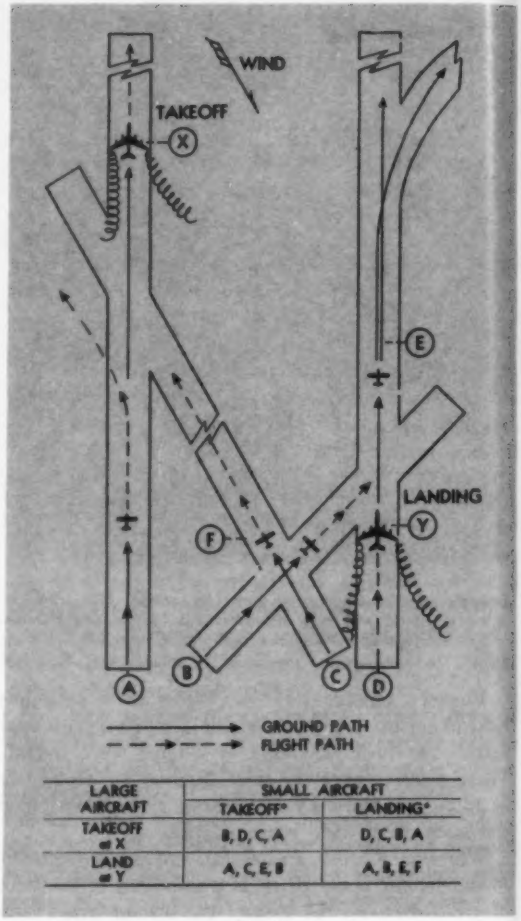
Unfortunately, the best advice is not always the most practical. In the case of vortex turbulence avoidance, to insure 100-percent success would require pilots of smaller aircraft to refrain from operating in areas where the very large and heavy aircraft regularly operate. It would produce the desired result but would not be practical. The following suggestions are therefore offered on how best to avoid wake turbulence.

General Rule

When it is necessary to operate behind a large heavy aircraft try to *remain above the flight path of that aircraft.* Remember that vortices *settle* toward the surface. Also keep in mind that they are affected by the wind and move with the air mass down to within 100 ft of the ground before spreading laterally away from each other. Another point to remember is that the wind will continue to affect the vortex cores until dissipation occurs. Because of the infinite number of possible circumstances, it is not practical to establish a set of inflexible rules. Therefore, only several of the many possible situations and suggested courses of action are depicted in Fig. 2.

Light Plane Takeoff *vs* Heavy Plane Takeoff

If departing in a light aircraft shortly after a big job has lifted off on the same runway, or on one parallel to yours, start the takeoff roll at the approach end so that you will lift off at a point prior to where the heavy aircraft got airborne. If a normal performance takeoff and climb is made, you should be behind and above the settling vortices of the preceding aircraft. Don't depend upon the wind to dissipate the vortex core circulation appreciably unless it is 10 to 15 kts or higher and even then it could take several minutes. Also, remember that the



LARGE AIRCRAFT	SMALL AIRCRAFT	
	TAKEOFF*	LANDING*
TAKEOFF @ X	B, D, C, A	D, C, B, A
LAND @ Y	A, C, E, B	A, B, E, F

Fig. 2
Example takeoff/landing alternative course of action.

lateral movement of vortices, even in a no-wind condition, may place a vortex core over a parallel runway. With a light crosswind one vortex can remain stationary over the ground for some time, or even move upwind, before dissipating to any significant degree.

When taking off on a runway that intersects one just used by a heavy aircraft for takeoff, you should not encounter vortices or any appreciable thrust stream turbulence providing you can obtain 100 ft or more of altitude before passing over the intersection. Remember that the larger aircraft will probably have a high gross weight at takeoff and thus will generate vortices of maximum intensity. Also, consider the lateral movement of vortices and the possible effect the wind will have upon that movement.

Light Plane Takeoff *vs* Heavy Plane Landing

When taking off on the same runway just used by a heavy aircraft for landing, or one parallel to it, plan to become airborne beyond the point where the other aircraft landed. Remember, while starting takeoff from an intersection may keep you out of the vortices of an aircraft that has just landed, it could place you in the vortices of one that took off several minutes before on the same or a parallel runway.

The precautions to heed when taking off after another aircraft has just landed on an intersecting runway are the same as those for a single or parallel runway. But don't forget the "heavy" that may have taken off from either your runway or the other one within the past several minutes.

Traffic Pattern

Don't fly below and behind a large aircraft in the traffic pattern. If practicable, plan your pattern to stay laterally separated from large aircraft by at least several hundred feet. When on the final approach, an above and behind position should keep you clear of the turbulence created by the preceding aircraft.

Light Plane Landing *vs* Heavy Plane Landing

The same above and behind position on final approach will place the light aircraft pilot in a good position to touch down beyond the point where a preceding large aircraft has landed, length of runway permitting. If the runway has a visual approach slope indicator (VASI) system, a flightpath in the "red and white" or with the top bar appearing a bit pink will keep you on or slightly above a normal glide slope.

Light Plane Landing *vs* Heavy Plane Takeoff

When landing after takeoff of a large aircraft, make a normal landing near the approach end of the runway and be solidly on the ground before reaching the point where the large aircraft took off. Although vortices from the departing aircraft will not be formed until the point of rotation, remember that the wind can cause the turbulence to move down the runway toward you.

Conclusion

When operating in the vicinity of an airport, you may receive an advisory, *"Caution wake Turbulence,"* etc., warning you that it may exist because of an aircraft that recently made a takeoff or landing. When you receive such an advisory, don't hesitate to request further information if you believe it will assist you in analyzing the situation and determining the course of action you wish to take.

Remember, even though a clearance for takeoff or landing has been issued, if you believe it safer to wait, use a different runway, or alter your intended operation, then ask the controller for a revised clearance. Sometimes air traffic clearances include use of the word *"Immediate."* For example, *"Cleared for Immediate Takeoff."* In such cases, the word is used for purposes of air traffic separation. The clearance may be refused if you believe another course of action would be better suited to your intended operation. The controller's primary job is to aid in the prevention of collision between aircraft. However, he will assist you in any way he can while accomplishing the job.

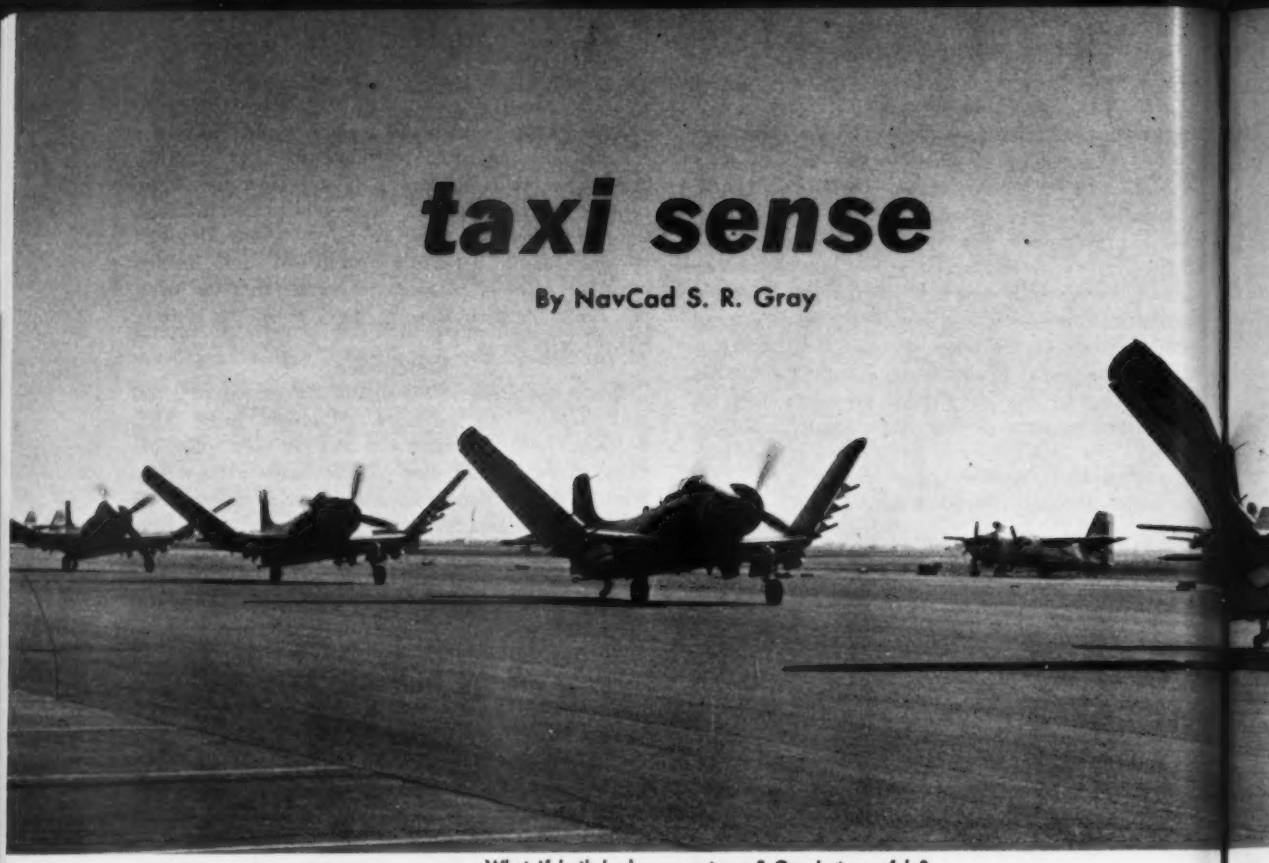
—Adapted from FAA Pamphlet, AC-90-23A.

BY CAREFUL PLANNING AND BY TAKING NO UNNECESSARY CHANCES, MY MEN AND I HAVE LIVED TO ENJOY THE HAZARDS AND THRILLS OF ADVENTURE AND DISCOVERY. WE FOUND ADVENTURE ONLY BY PLANNING FOR SAFETY SO FAR AS POSSIBLE.

ADMIRAL RICHARD E. BYRD

taxi sense

By NavCad S. R. Gray



What if both brakes go out now? Can I stop safely?

It's late afternoon. You are No. 4 man in the flight. Every ounce of concentration you possess is concerned with flying a precise wing position.

As you swing into the break, No. 3 gives you the "kiss-off" signal. Again you are concentrating on flying a smooth level break, lining up on the downwind leg and performing your landing check list.

You call the tower for landing instructions and receive clearance to land. All the way down and around to touch down you are thinking and reacting many times faster than you do on the ground. Constantly cross-checking cockpit instruments, glide slope and runway line-up keeps you tense and alert.

You have made a nice landing right on the numbers. You roll out and slow to turn onto the taxi way, then you think, "Well, another flight completed, a piece of cake." Up until now you have flown a good hop, but here you have made your first big error. You are thinking about how good that hot shower will feel and how much fun you will have out on the town tonight.

Suddenly, without warning, the awaiting accident strikes. You feel a soaring shock as your port wheel drops off the edge of the taxi way. The port main mount sheers under the stress. The port tip tank ruptures on sharp stones and the last little puddle of JP-4 residue in the tank ignites. A half million dollar aircraft goes up in flames.

Does this sound incredible? Perhaps—but it happens! Fortunately, very few taxi accidents are as serious as the tale above. In fact, for the most part, taxi accidents seem of minor consequence until taken collectively and totaled up against the more spectacular crashes.

Taxi accidents and incidents usually aren't published much outside one's own squadron. In the *Weekly Summary*, and other flying magazines, many pages are devoted to midair collisions and the like. After all, tales of mid-airs and low altitude flameouts make much more interesting reading than a report of some joker running into another aircraft while taxiing.

But still, let's consider taxi accidents. During fiscal 1965 I understand that there were 169 taxi accidents/incidents *reported*. (*You are right!—Ed.*) The

dollar cost of these mishaps came to a cool $4,129,-670.00! Of the 169 aircraft involved, four, occurring aboard ship, received Alfa damage. While statistics on inflight mishaps during a similar period would be much more impressive, this data is significant.

When we finally realize how numerous taxi accidents are, we wonder just how the heck you can have a taxi accident.

Here we have a pilot who has been trained to operate an aircraft to its maximum efficiency.

He is capable of flying within a few feet of another aircraft in very precise formation.

He can fly safely on instruments alone.

He is very proficient.

Yet he has a simple taxi accident. What skill does it take to taxi an aircraft? How many hours of training are required to learn to taxi? How could a professional aviator have a taxi accident?

I feel that the reason for most taxi accidents can be summed up in one word—*Complacency*. The idea that the hop is over before the aircraft is in the chocks, and the yellow sheet signed off, the relaxation after the intense concentration of flying, and the feeling of well being are the danger signs of complacency.

I feel that for these reasons it is hard for us to realize that the simple, mundane procedure of taxiing back to the line should require just as much alertness as flying wing position.

But how do you tell when your attention is being diverted?

How do you know when you are beginning to relax?

Well, it's very difficult. Taxiing is such a familiar part of flying, but familiarity breeds contempt. I think the same rule of thumb we use in the landing pattern should be used for taxiing. When you feel at ease, when you feel relaxed, look around quick to see what you have forgotten.

To make sure I stay alert from the runway to the chocks, I am going to play the "What if" game.

What if both brakes go out now? Can I stop safely?

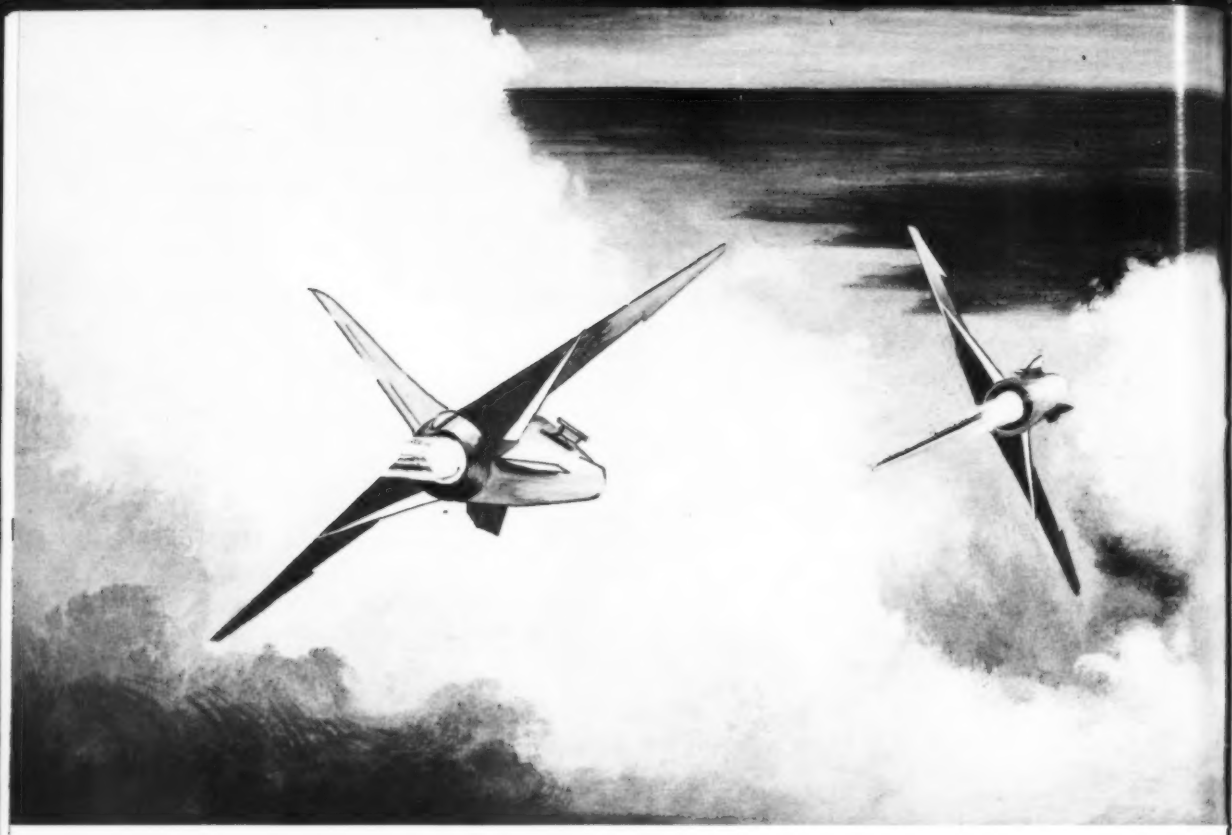
What if a piece of ground equipment drives in front of me suddenly. Can I avoid it?

Just like knowing inflight emergency procedures cold, one should know taxi emergency procedures cold. Know what you will do if something happens.

There are definite procedures and rules for taxiing an aircraft. Of course, we all know the rules; in fact we may know them too well. When you know something too well, you may tend to quit thinking about it. When that happens, however, you may be setting yourself up for an accident.

So, let's review some of the procedures we tend to take for granted.

- Taxi no faster than you can safely control the aircraft no matter what might develop.
- Keep your head out of the cockpit.
- If you must turn switches and look at them, wait until you can come to a complete stop.
- If you become confused as to directions, stop and call for assistance.
- If there is mechanical difficulty which may hamper safe taxiing, stop, shutdown and get a tow tractor.
- Never allow your attention to wander from taxiing.
- Use the same concentration when taxiing as you do while flying.
- Recognize the danger signs of complacency, and never never think that it can't happen to you . . . It can!



Tiny Time Capsules

AWHILE back a young troop was having that "ache-all-over" feeling and he evidently wasn't satisfied with the assistance he was getting from the flight surgeon. His wife said she had just the thing to make him feel like a million. (A million *what* she didn't say.) Young troop started taking his wife's tiny time capsules and after being on them for a short time, he did indeed begin to feel wonderful.

Meanwhile, back at the base, young troop was scheduled to fly wingman in a two-plane flight. Down with the pills, on with the G-suit. Takeoff and the first few minutes of the flight were OK. After being airborne about 15 minutes, things started to happen.

The wingman didn't like his position so he started to move in. Lead didn't like the new position so he told the wingman to move out. Lead called the wingman to move back in. Full AB and *charge*. Leader pulled up just in time as No. 2 went smoking through the spot that Lead had just vacated. The same thing was repeated a few more times.

For the next few minutes the two pilots engaged in one of the most heroic air battles since WWI. Lead tried to outrun No. 2 but he had the slower bird. After trying all of the old tricks and inventing some new ones, Lead got on No. 2's tail. Lead, in a high pitched voice, convinced No. 2 to just fly straight and level, then return to home base. The wingman was a little reluctant to break off the fun but the leader was more reluctant to be airborne with him. An uneventful landing was made by both aircraft except the leader was now 10 pounds lighter.

Turned out those tiny time capsules the wingman was taking contained belladonna. Belladonna (beautiful lady) is known in medi-

cal circles as a mydriatic, a drug used to dilate pupils of the eyes. After the wingman swallowed his pills, he had to get pretty close to the leader to be able to see him!

Please leave medications to the flight surgeon and the washing of dirty socks to the wife.

—(*ATC's Approach to Safety*) *Aerospace Safety*

Bird Strike

AN F-4C was No. 3 in a flight of three on a low-level navigation mission with radar bombing. Following the second delivery, after turning onto the downwind leg, the pilot saw a large bird just ahead and above the aircraft. There was no time to take evasive action. The bird impacted the front canopy on the right side just above the canopy rail. The canopy was shattered with fragments of canopy and bird entering the cockpits.

Both crewmembers had their helmet visors down and sustained no injuries. The aircraft returned safely to base.

It Smarts!

AFTER overland parachute descent and touchdown, a pilot discarded his hardhat. During helo rescue he bumped his head against the aircraft.

Flight surgeon's recommendation: Reemphasize the importance of wearing the hardhat during rescue operations.

Report On AOH-1

DURING a routine night exercise with a ship about 50 miles at sea, a DF-8F pilot had a generator failure and inadvertently jettisoned the canopy. Altitude was 30,000 ft and airspeed 300 kts. The pilot experienced very rapid decompression after which radio communications, oxygen flow, and visibility were all normal. His AOH-1 helmet protected his head from windblast although he felt some around his neck. No other physiological effects were noted. After landing he found that, as designed, the tinted visor had blown off his helmet along with two retention nuts.

The squadron CO believes that without the AOH-1 helmet, the pilot would have encountered severe wind blast in the face and a probable loss of communications.

"The protective advantages of the AOH-1 under these circumstances," he says, "are noteworthy."

Propeller Arc

RECENT Aviation Safety Council minutes reported instances of men walking "with apparent disregard" through the danger area of a propeller arc. Even though the props aren't turning, someone working in the cockpit might move a switch, causing the props to turn, the council says.

Avoiding the danger area of a prop arc is a fine habit to acquire.

"It's all right, Commander, he just dropped his brush."

Value of Training

MY command continually emphasizes equipment and its proper use. The value of this became evident to me when I recalled knowledge that had been stored away during briefings received several months ago.

Lessons learned from discussions of various possible incidents in APM's allowed me to act quickly in the minutes following ejection.

—*Pilot after ejection*

Dunker Recall

ON ditching, a UH-2A seemed to travel forward and invert simultaneously. A rush of water hit the pilot in the face. Then he was completely submerged. He knew he was inverted because of the pressure from his shoulder harness and lap belt.

With immediate recall of his Dilbert Dunker training, he waited for the air bubbles to clear, released his safety harness, took hold of the side panel and pulled down and out to evacuate the aircraft which was now 6 to 10 ft below the surface.

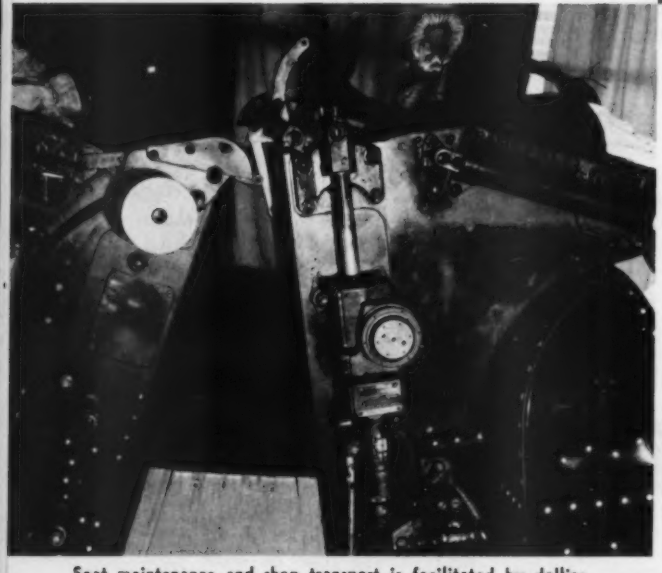
All four crewmembers were rescued by a second helo.

CO_2 Cylinder

AFTER a helicopter accident, the copilot reported that pulling the right toggle of his new style Mk-2 life vest did not inflate its CO_2 compartment. The left toggle operated normally. Examination showed that the copilot had not screwed the right CO_2 cartridge in tightly. The small size of the hole punctured in the cartridge resulted in slow inflation. *This could have been prevented by more careful preflighting of the vest.* As a remedy at the time he could have inflated the compartment orally.

Appearances are Important!

By SSgt H. H. Strunk
NAMTD 1024 (F-4)
MCAS Cherry Point, N. C.



Seat maintenance and shop transport is facilitated by dollies. Author, upper right, demonstrates seat ready for F-4 installation.

The Martin-Baker ejection seat has saved over 1000 lives—more than 300 of which have been Navy and Marine Corps pilots and RIOs.

This record speaks for the Martin-Baker ejection seat better than a salesman ever could. With such a record no individual in a flight status should ever hesitate to pull the face curtain if the need arises, because the seat will work as advertised, and then some.

Yet, to the average individual the thought of having to eject from a high-speed, high-altitude jet aircraft kind of makes the little hairs on the back of his neck tingle and stand at attention.

Therefore, it is our job in the Safety and Survival Equipment field to keep "selling" this seat to flight personnel and build up their confidence in its capabilities. We want no hesitation on their part when it comes time to eject.

You know and I know that every man in charge of every Seat Shop within the services is interested in turning out a quality piece of equipment that will

perform reliably every time.

To do this, we must and we do perform all the vital tests and maintenance necessary to assure this quality. Step back, however, and look at your finished product.

What does it look like?

Like any other ejection seat that has been around for a year or so?

Like any other ejection seat that has been pulled a hundred times or more?

Chances are the answers to these questions are "yes." You know the seat will work because you are familiar with all its mechanism—but that pilot or RIO may not have as much confidence in the seat if its outward appearance is marred. A little dirt here and there, plus some scratches and a few torn decals may be just enough to put a bit of doubt in his mind as to the reliability of that particular seat, and a doubt as to the quality of the maintenance performed on it. Not enough doubt that he might question the conditions, but a whisper of a doubt nevertheless.

Look around at the conditions in your shop. Do things look pretty orderly—or are things just a little messed up and a trifle helter skelter? Now I don't mean that things should all be perfect with nothing out of place—after all, we are working in the shop—but what appearance does our shop make to a visitor stopping in for just a moment? Don't tell me, that as a shop chief you don't evaluate conditions in another man's shop when you go visiting!

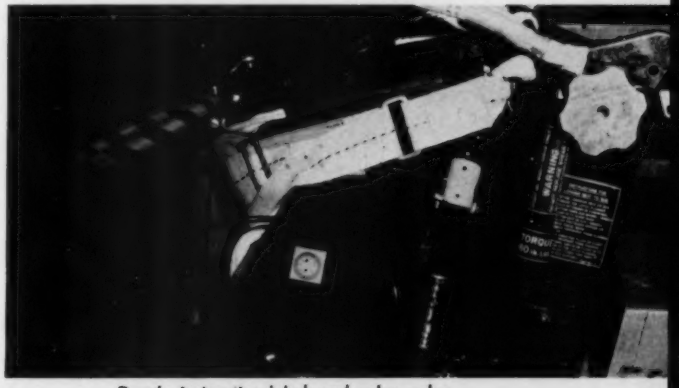
And finally, take a look at yourself and the men working for you. What is the condition of their uniforms, haircuts, shoes, etc.? Would you want to trust your very life to a man who looked as though he really didn't care much about his own—as evidenced by his dirty utilities, run down heels and shaggy head of hair? The appearance of such a man doesn't instill confidence in his ability to perform the necessary maintenance on the seat, does it?

Yes, appearances *do* count, and count quite a bit. A seat that is clean and touched up with paint where needed, plus a clean and well organized shop that is staffed with a crew of men who present a neat military appearance, goes a long way toward assuring the flight crews that they have the very best of equipment and most qualified maintenance personnel looking out for their lives.

It is what they *see* that counts in this instance. We know the importance of first impressions. Make certain that you and your men reflect the quality of the maintenance performed on the aircrewman's equipment.

Show your interest in his life!

Installed M-B seat is inspected thoroughly.

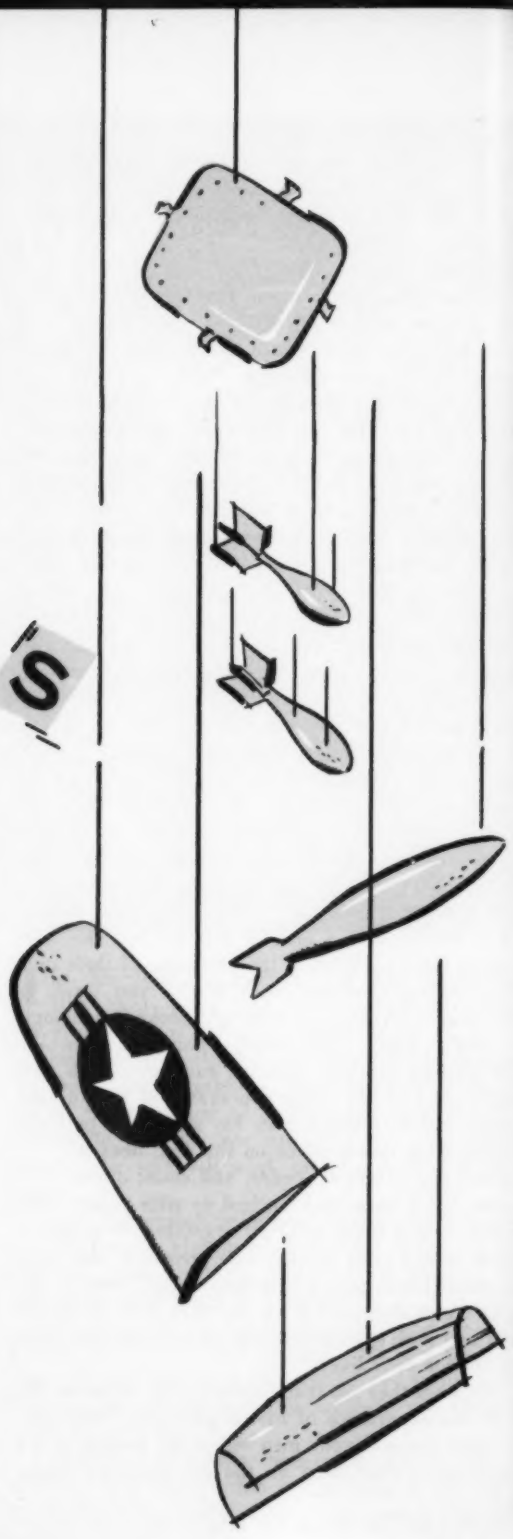


Decals, instruction labels and color codes must be legible and in top shape.

Yes, appearances are important to the aircrew.

Quarterly Report

IDENTIFIED FALLING OBJECT



IFO

C-130—4—prop spinners
F-4B—1 Drag Chute—1 Radome—1 pylon and launcher
T-1A—1 Access Door
RA-5C—1 Heat Stack—1 Radome Door
SP-5B—1 Escape Hatch
SP-2H—1 Upper Nacelle Assy.
A-6A—1 Air Conditioner Access Panel—1 Forward Stbd. Access Door
A-3B—1 Plexiglas Panel
F-8—1 *Outer Wing Panel*,—1 Access Door, 1 Wing Access Panel—1 Cockpit Canopy—1 Tow Target and Cable
E-1B—1 Radome Door
TF-9J—1 Fuselage Door, 1 Canopy Control Access Door, 1 150-gal external tank
AF-9J—1 Cockpit Canopy, 1 Tail section
A-4—8 Bombs, 1 Mk-76 Bomb, 1 MBR and 2 Flares, 1 MER and 6 250-bombs
SH-34J—1 Forward Cabin Door

136 MAINTENANCE GOOFS

Of the 136 Maintenance Goofs occurring during the first quarter of fiscal '66, IFO—Identified Falling Objects—parts separating from aircraft in flight—accounted for the largest share. There were 31 mishaps of this type resulting in 45 objects becoming detached. *See the box score on the adjoining page.*

The number of inflight losses of hardware points to a need for meticulous attention to proper security especially during preflight and quality control.

There were 12 cases of under- or overtorque, 7 FOD, 5 Murphys and 4 cases of throttle disconnects. Table I reflects the severity of damage and dollar losses resulting from all of the maintenance errors. Table II shows the number of errors committed by ratings and aircraft involved. A study of these and the briefs will provide guidelines for reducing the number of maintenance goofs in the shop and on the line.

Table I
Damage and Cost

A-Strike
B-Overhaul
C-Substantial
D-Minor
E-Limited

A-1	E	$ 450		D	16,000
A-3	B	300,000		E	6,600
	C	75,000	F-9	D	10,000
	D	3,000		E	1,500
P-2	E	3,640	E-1	E	2,340
P-5	E	3,000	C-47	C	8,800
S-2	C	25,000	C-54	E	1,200
	E	1,820	C-118	E	1,450
A-4	B	95,000	C-130	E	11,100
	D	26,500	T-1	E	2,400
	E	8,000	H-1	B	84,000
A-5	E	1,250	H-2	A	910,000
A-6	E	2,500	H-3	E	8,660
F-4	D	136,500	H-13	A	183,000
	E	18,200		B	51,000
F-8	A	1,109,000	H-34	E	2,820

Total $3,109,730

Table II
Maintenance Errors by Rating and by Aircraft

Rating / Aircraft	AD	AM	AT	AE	AO	PC*	Totals by Aircraft
A-1					1		1
A-3	1	2		1			4
A-4	7	5			11		23
A-5	3	3	1				7
A-6		5					5
F-4	3	8	1	4	3		19
F-8	1	7			2	1	11
F-9	1	4		1	1		7
F-11	1						1
T-1	2	2					4
T-2	1						1
H-2	1						1
H-3	1	1		1			3
H-34	3	1					4
S-2/C-1	2	2					4
P-2	5	1		1			7
P-3	8			2	1		11
P-5	2	1					3
C-45	2	1					3
C-54	1						1
C-117				1			1
C-118	1	1					2
C-121	1						1
C-130	4						4
E-1		1				1	2
C-47	1						1
H-13	1	1					2
H-1	1						1
F-10	1						1
T-34	1						1
Totals	56	46	2	11	19	2	136

*Plane Captain

AD

RC-45J Murphy's Law—Misrigging of the fuel tank selector valves caused both engines to quit.

KC-130 Failure to properly secure the afterbody on the No. 3 propeller resulted in its loss and damage to the aircraft.

SP-2H Improperly installed jet pylon fuel filters caused a fuel leak and resulting inflight fire.

UH-13P Murphy's Law—The main rotor head hub core was installed upside down. The rotor assembly slid down the mast resulting in uncontrollable collective.

NA-4B The forward main landing gear door was damaged when the starter probe was left in the aircraft.

P-3A Improper rigging of propeller controls prevented feathering of the prop.

P-3A Failure to properly service the propellers resulted in shutdown of the No. 1 engine.

P-3A Improper servicing and misrigging of the propeller resulted in a propeller pump light illumination and failure to feather.

DP-2E Failure to install a cotter pin resulted in the separation of the throttle linkage, the securing of the engine and a single-engine landing.

RA-5C Neglect to account for all tools after maintenance resulted in FOD to an engine.

TF-9J The use of a mallet or hammer on the combustion chamber covers caused dents which eventually contributed to the failure of the covers.

P-3A An apparent oil leak in flight caused shutdown of an engine. It was determined the oil was not cleaned off following maintenance.

F-4B CSD input spline not completely engaged on engine caused the right generator to fail.

F-8E A pair of pliers left in or adjacent to the engine intake duct caused FOD and an engine change.

SP-5B Murphy's Law—Installation of a fire extinguisher valve backwards, caused diversion of the extinguishing agent to the engine compartment instead of the generator/CSD.

UH-1E Undertorque of the B-nut on an oil line allowed the nut to back off three turns causing oil pressure loss and a forced landing.

TS-2A Failure to torque a B-nut on the fuel line leading from the downstream side of the cabin heater solenoid resulted in fuel leakage and fire upon landing.

S-2D Failure to torque the B-nut on the fuel transmitter line resulted in a single-engine landing on a carrier.

A-5A Improper lock-wiring of the oil filter caused failure of the CSD and generator.

SH-3A Installation of an oversized O-ring seal in the centrifugal fuel purifier resulted in the deceleration of the No. 2 engine.

C-54Q Improper installation and lack of quality control resulted in a cylinder deflector assembly wearing a hole in No. 14 cylinder intake pipe coupling.

C-118 A loss of BMEP on takeoff was caused by a steel screw which was dropped into the nose section of the engine during a magneto change.

C-130 Improper security of the top half of the after spinner body on No. 3 engine led to its separation and damage to the propeller.

P-3A During a 3-engine loiter when an attempt was made to start No. 1 engine the negative torque system light came ON. The negative torque system plunger was improperly set.

A-4E Failure to comply with a Power Plant Bulletin which requires an inspection of J-52 engines equipped with Series 413XXX combustion chamber liners each nine weeks resulted in extensive fire damage to the engine and airframe.

A-3B Loose gear left lying in the immediate vicinity of jet intakes caused FOD to the engine.

P-3A Improper servicing of propeller fluid caused a low level light and securing of the engine.

SP-5B The shim plate assembly for the No. 2 propeller blade was installed on the No. 4 blade causing damage to the propeller assembly.

UH-2B Improper torque of hex bolt PN AN 101107 in the shoulder shaft PN 37C300-252-P103 permitted the starter back off. A wobble developed causing interference of accessory drive pinions.

TF-10B Failure to install a cotter pin in the throttle linkage at the fuel control allowed the linkage to separate and engine to flame out in landing pattern.

TC-45J The improper installation of the snap ring for the piston sleeve bushing the propeller caused an oil leak and prevented unfeathering of the engine.

UH-34D Failure to take proper precautions in high winds allowed the clam shell door to slam, damaging the door snubber and mounting bracket.

EC-121 Failure to properly lockwire the rocker arm shaft cap caused an oil leak and engine shutdown in flight.

T-1A Failure to check cockpit and switches prior to applying power resulted in fire, the use of extinguisher and an engine change.

A-3B Improper refueling procedures caused the port wing aft spar to split.

C-47J Failure to properly tie down the tail, remove surface locks or put nose into the wind resulted in a nose-over damaging the props and tail wheel.

T-1A Failure to properly secure a compartment access door resulted in its loss in flight.

T-34B Installation of the wrong size mesh screen in the fuel valve strainer allowed foreign matter to flow past and clog the fuel control strainer causing a loss of fuel pressure in flight.

SP-2H Undertorque of B-nut on the inlet oil line resulted in a severe oil leak causing the securing of the engine.

A-4E Overtorque of oil filter bolts resulted in two of them breaking.

T-2A Overtorque of the seal segment retaining bolt resulted in the failure of the turbine.

P-3A Improper securing of oil cap allowed the cap to come loose and propeller oil to siphon over the side.

A-4E Improper handling and stowage of engine insulation blankets resulted in a fire in the aircraft when the blankets were installed.

A-4E Intake screen was not installed prior to ground turn up—three ejection seat pins and flags were ingested into the engine.

SP-2H A cross-threaded spark plug caused damage to the cylinder resulting in the securing of the engine during flight.

F-11A Failure to account for all tools after performing maintenance resulted in engine FOD.

KC-130 Propeller spinner afterbody not properly secured caused loss of the part.

A-5A Maintenance personnel damaged the port flap rod assembly by pushing on the flap.

F-4B Failure to lockwire a fuel fitting caused it to back off. Loss of 600 pounds of fuel was experienced during runup.

KC-130 An improperly installed afterbody cover caused the cover to come off and damage the propeller blades.

P-3A Because of improper security, the AC generator bearing baseplate screws worked loose and sheared causing generator power loss.

SH-34J Cross-threading of a fitting on a fuel line resulted in a severe fuel leak and engine stoppage one mile from destination.

A-4C Disconnect of throttle linkage occurred because the securing nut was not properly installed.

SP-2H A fire detector element mounted too close to the fire wall caused a false warning light. No. 2 engine was secured in flight.

F-4B Improper installation of throttle linkage bolt nut and cotter pin resulted in a power loss and a single-engine landing.

UH-34D Failure to lock the "crutch" resulted in a dropped main rotor blade.

AM

TA-3B The starboard main landing gear torque bolts were installed only fingertight causing wheel failure.

RA-5C The heat stack was lost due to the incorrect brake retainer lock pin being installed.

A-6A Failure to properly lubricate the shock strut torque collar caused binding of the shock strut.

A-5A Maintenance personnel used improper procedures in installing the wheel brake retainer.

A-6A The auxiliary brake gage was improperly calibrated giving the pilot a false reading.

A-4C Incomplete servicing of the brake system caused a brake failure on landing. Aircraft ran off the end of the runway.

SP-5B The escape hatch separated from the aircraft due to failure to recognize worn locking pins.

SH-3A Improper seating of the No. 3 droop stop during blade fold caused the blade to unseat and fall to the ground.

F-4B Underservice of both PC reservoirs caused the complete loss of control upon landing.

A-4C Improper installation of a Service Change resulted in a no-gear extension during ground check.

F-4B Failure to note cracked and chafed hydraulic lines created a condition which would not have sus-

tained the emergency landing gear system if required.

S-2D Failure to replace a broken fuel filler cap with the proper cap resulted in a high rate of fuel loss.

A-6A An improperly secured air conditioning access panel separated from the aircraft in flight.

TH-13N Installation of an improper bolt in the control system caused loss of control and crash.

A-6A An aluminum spacer left adrift at the base of the control stick caused a binding of flight controls.

A-3B Unequal stress upon installation of a plexiglass panel caused the panel to blow out at 12,000 feet.

F-4B Improper installation of the drag chute resulted in the separation from the aircraft when it was deployed.

VC-118 Flaps lowered without an outside observer resulted in damage upon striking a workstand.

S-2F Failure to install a cotter pin in the landing gear door actuating cylinder resulted in a wheels-up landing.

SH-34J An improperly secured forward cabin door caused its inflight loss.

F-8A Failure to down an aircraft with a known discrepancy. The wing lock cylinder shaft broke but the aircraft was cleared for flight. The left outer panel separated from the plane in flight. Strike damage.

F-4B Overtorque of a hydraulic pressure line fitting caused a utility hydraulic failure in flight.

F-4G Failure to torque and lockwire an engine bleed air duct clamp caused extensive heat damage.

TF-9J The improper latching of a fuselage door on preflight resulted in the loss of the door in flight.

A-4B The nose gear ground lock pin was improperly installed resulting in collapse of the gear when the aircraft was turned up.

F-4B Undertorque of a hydraulic pressure line caused utility hydraulic failure in flight.

SP-2H An improperly secured upper nacelle assembly separated in flight.

A-4C Improper routing of the brake line caused brake failure on landing.

F-8C Failure to properly secure the port wing access panel and an improper preflight resulted in the loss of the panel in flight.

T-1A Failure to install the attach pin in the lower speed brake caused the cylinder to puncture the speed brake.

A-4E The nose landing gear was overserviced resulting in tearing of the shrink linkage when the gear was cycled.

A-5A Installation of an aluminum fitting instead of a steel one caused a hydraulic failure.

TF-9J Improper latching of the canopy control access door resulted in an inflight loss.

F-4B Failure to install a seat safety pin after arming allowed the seat to fire as the maintenance man was leaving the cockpit.

T-1A Undertorquing of a B-nut on a brake line allowed the nut to back off, causing failure of the left brake.

A-6A An improperly secured forward starboard equipment access door separated in flight.

AF-9J Improper installation of a tail section securing bolt resulted in tail section separation on an arrested landing.

AF-9J An improperly installed canopy after a prior jettison resulted in a second jettison in flight.

E-1B An improperly serviced landing gear timer check valve caused the gear extension prior to door opening.

RC-45J Murphy's Law—Crossed brake lines resulted in opposite control when brakes were applied.

F-4B Misrouting of a wire bundle and installation of an improper fitting in a PC1 line caused chafing of the wires, burning of the line and hydraulic failure.

AME

F-8B The use of an undersized safety pin in the canopy firing mechanism caused the canopy to fire during maintenance.

F-8A Improper canopy lock rigging caused canopy loss in flight.

F-8C Failure to install a safety pin in a canopy firing mechanism while arming the canopy actuator caused an unintentional firing of the actuator.

DF-8F Failure to insure that a canopy safety pin was installed resulted in jettison of the canopy during ground maintenance.

F-8C Failure to utilize the canopy safety pin resulted in inadvertent canopy firing while installing a seat.

AT

RA-5C Because the radome fold switch access door fasteners were not properly secured, the door came off in flight.

F-4B Because of improper latching, the radome separated from the aircraft in flight on the first flight after installation.

AE

F-4B Undertorque of self-locking nut resulted in generator failure.

F-4B Improper installation of fire warning cables caused an engine shutdown and single-engine landing.

C-117D Undertorque applied to the breaker assembly of the magneto resulted in the cutting out of the engine during flight.

P-3A Failure to depressurize the radar receiver/transmitter prior to performing maintenance caused a crewman to be injured while working on the set in flight.

F-4B Lead-in wires to the port fuel boost pump check switch were not properly installed nor secured causing a flameout of both engines shortly after start.

P-3A Failure to comply with MRC Cards resulted in an improper inspection and chafed wiring.

SP-2H Failure to align a CSD disconnect resulted in the No. 3 AC generator light illuminating. Reset was unsuccessful.

F-4B Failure to fasten the dust cap to the test receptacle resulted in a vertical gyro failure in flight.

SH-3A Use of lubricant on the APU plug or external power receptacle resulted in fire when power was applied.

TF-9 Poor coordination and lack of supervision resulted in an electrical fire and 200 man-hours of work. A man in the front cockpit was disconnecting the wing-lock swivel linkage behind a console while another man in the rear cockpit performed a systems check with battery power. A disconnected line contacted the hot circuit breaker panel.

A-3A Murphy's Law—The wiring was reversed in the hytrol brake system rendering the brakes inoperative and caused the aircraft to overrun the runway. Strike damage.

AO

A-4C Failure to home the A/A 37B-1 and the automatic homing device prior to loading the stores resulted in the release of eight bombs in train.

A-4B Failure to use the proper procedures in de-arming the 20 MM guns resulted in the inadvertent firing of one round.

A-1H Failure to install cotter pins in the Aero 3A bomb rack allowed the bomb ejector foot to fall free from the center station.

F-8C Installation of an undersized shear pin in the release adaptor bar caused inadvertent dropping of the target banner and cable.

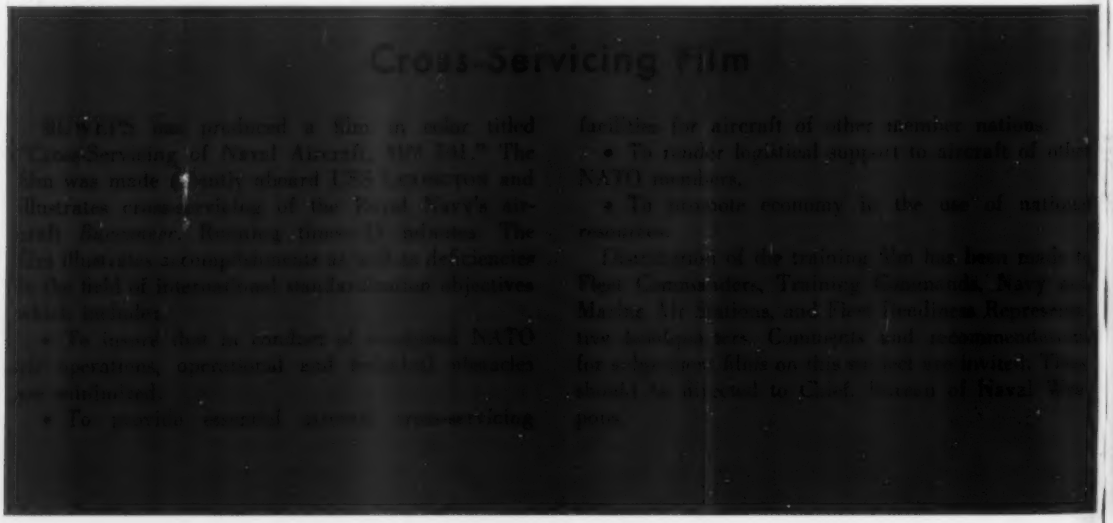
A-4E Improper installation/adjustment of the Aero 7A ejector foot assembly allowed gases to blow the breech upward damaging the lower skin of the wing.
A-4E Failure to remove cartridges from Aero 20A ejector racks on stations No. 1 and No. 5 when not in use caused the firing of the ejector feet when the pilot selected ALL and pressed the pickle.
TF-9J Failure to lock an Aero 65A wing rack resulted in an inadvertent jettison of a 150-gallon external tank.
F-4B Failure to remove the cartridges from a pylon prior to testing circuits resulted in an inadvertent jettison of the pylon and launcher.
A-4B Placing of an unauthorized load on the centerline station resulted in damage to the aircraft.
A-4C Failure to clean corrosion from a PMBR resulted in a false indication that the rack was cocked. A Mk 76 bomb was inadvertently dropped.
A-4C Failure to comply with AAB 319B which requires checking of circuits prior to flight resulted in unintentional release of an external store.
A-4C Failure to connect the primary lead of the Aero 7A-1 ejector rack to the A/A37B-1 MBR which was suspended from the Aero 7A-1 rack resulted in inadvertent jettison of the MBR and two flares.
F-8E Failure to properly install a cotter pin in the gun retainer ring allowed the gun to slide aft and the expanding gun cases to damage the gun bay and intake duct.
A-4B Failure to install a cartridge in the center line station and overextension of the ejector foot resulted in a hung baggage tank.
P-3A A Mk 25 Signal left in the retro ejector from a flight two days previous was inadvertently fired during a preflight inspection.
A-4E Selection of the wrong switch while checking voltage coupled with an improperly installed safety pin resulted in dropping an external fuel tank on deck.
F-4B Failure to insert the shear pin in the aft end of the pylon allowed the pylon and attached external fuel tank to fall to the deck during installation.
F-4B Failure to pull a stray voltage check resulted in jettison of the LAU-17A pylons onto the parking ramp.
A-4B Failure to properly install a safety pin in an Aero 20A rack and lack of a final check of the emergency release system resulted in the jettison of one MER with six 250-lb bombs.

PC

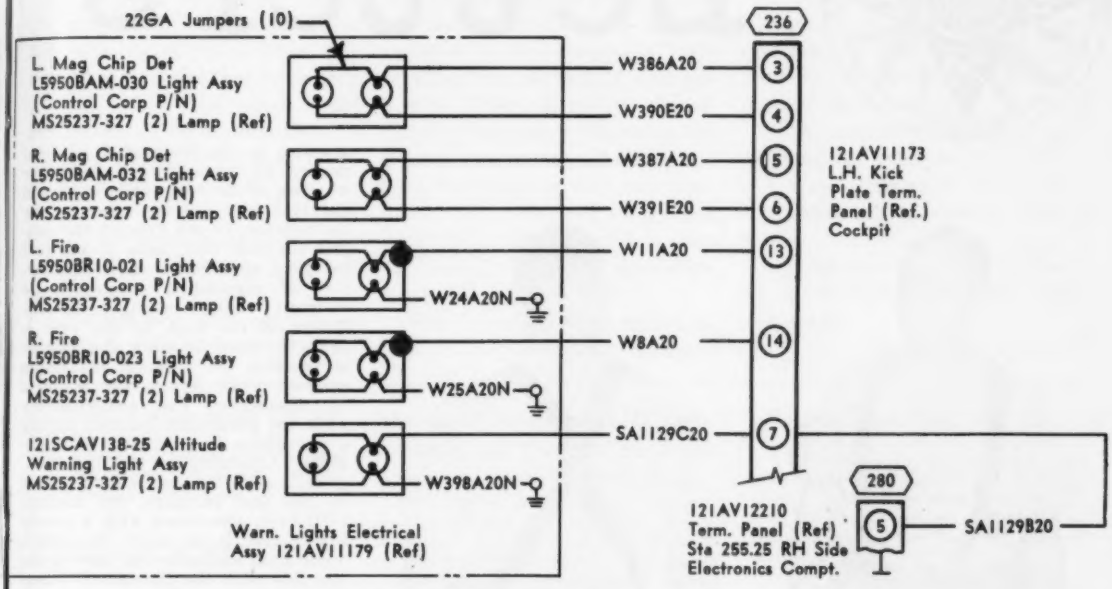
Plane Captain

E1-B Improper preflight resulted in the loss of the radome door.

F-8A Incomplete preflight resulted in separation of a door during flight.



Murphy's Law*



Wiring diagram of the correct installation. Dots indicate points of cross-connection.

S-2E Cross-Connected Fire Warning Lights

While troubleshooting what proved to be a false fire warning light in an S-2E, cross-connected electrical terminal leads were discovered. In this condition a fire in the port engine would cause the starboard warning light to come ON and vice versa. The prospect of a pilot feathering his good engine in the event of an inflight fire makes one shudder at the thought.

Murphying of the wires occurred during PAR when Airframe Change 409 (AN/APQ-107 Radar Altimeter Warning System) was incorporated.

This incident should spotlight the importance of a continuity check following connection of electrical terminals.

—Contributed by L. D. Persels, ASO, VS-29

* If an aircraft part can be installed incorrectly, someone will install it that way!

Letters

Fig. 1

Fig. 2

Survival Vest

FPO, San Francisco—Air Anti-Submarine Squadron 29 has designed and adopted for use a new survival vest. (See Figs. 1 and 2.) Our new vest is less bulky and considerably cooler than the standard Navy issue survival vest. It has a great deal of versatility in that it may be modified to suit the needs of different operating areas. It also provides a place to carry the .38 caliber pistol and may be modified to carry numerous bandoliers of 12 rounds each as shown in the photographs. The SEEK I survival kits are also carried on the vest where they do not cause discomfort to the wearer. . .

We solicited the aid of the U. S. Naval Aerospace Recovery Facility in evaluating the compatibility of vest and parachute. The response was gratifying. The facility conducted a series of 15 test jumps wearing the vest. We have recently improved the vest by incorporating a hook and pile fastened flap over the cartridge bandolier to prevent loss of cartridges. We're still looking for ways to further improve the vest and will keep you apprised of significant changes.

A. R. KREUTZ
CO, VS-29

• **Here are the conclusions of the NARF report:**

"For the sake of survival, a compromise in the form of a minimal degree of discomfort due to the wearing of an adequately equipped survival vest can be tolerated by the aviator. In the case of the subject survival vest, none of the test jumpers considered their discomfort of significant magnitude to warrant radical changes in the design of the vest. If the vest is properly fitted to allow the aviator to position the vest for maximum comfort while flying, the problem of discomfort and compatibility with the parachute harness during a parachute descent will be negligible. According to the test program, and the comments made by the test jumpers, the discomfort, even associated with a poorly fitting vest, is not great. Therefore, while final authority for service usage lies with the Bureau of Naval Weapons, the subject vest is adjudged compatible with the NB-6 or NB-8 parachute harness during parachute deployment, descent and landing."

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

Jungle Survival

FPO, San Francisco—"Survival in the Tropics", a very informative APPROACH (October, 1965) article on the subject of tropic survival, mentioned at some length preservation of water in the body and methods of collection and purification of limited supplies of water. It failed to mention, however, some of the more easily accessible supplies of pure fresh water that are available in the jungle environment.

During a deployment to WestPac, this squadron had the opportunity to attend the Jungle Environmental Survival Training (JEST) Course operated by FAETUPac at NAS Cubi Point, P.I. The course, of one or three days' duration at the option of the command, was very informative and well presented. It included presentations on the collection of water from various vines and plant life common to the jungle, principally the bamboo tree which has

"Red Light—Green Light"

To some people it is only an object on a street corner with a policeman standing nearby; but to an aviator it can be a matter of life and death.

If a typical unit safety officer merely asked, unannounced, for the meaning of Aldis Light Signals, it is doubtful that more than 50 percent of the pilots could answer all of them correctly.

From within the ivory tower palace a person can sit and see many minor infractions of light signals but there is one that may cost you, and not only your hat and glasses.

Let's look at a short quote from OpNavInst P3710.7B of 10 February 1964: "When the tower is controlling an aircraft on emergency, aircraft on the ground shall taxi clear of the runway. Those on the taxiway will hold until authorized to proceed. All aircraft shall exercise radio discipline for the duration of the emergency." We all know this, but look at what else it says: "Pilots of taxiing aircraft sighting emergency vehicles on the field displaying the flashing red light, shall stop and hold their positions until authorized to proceed by radio or by light signals from the tower." Still old shoe—boring stuff?

Well, frequently crash trucks enroute to pre-positions for emergencies have been forced to *stop* by taxiing aircraft whose pilots were apparently more interested in looking for the distressed aircraft than in where they were taxiing.

If you're proceeding to or from any point on an airfield and an emergency condition involving someone else arises, please keep in mind the following:

- Be extremely alert for the movement of emergency vehicles
- Stay off the radio yet be sure to monitor all information transmitted
- Be alert for light signals, having learned their meanings well beforehand.

—*The Hot Dope Sheet*

a very adequate water supply available to the survivor.

This course is strongly recommended for all pilots and aircrewmen deploying to a tropical environment.

D. J. HAYES
CO, HS-2

• Thanks for the info.

Hi-Viz Tape

Monterey, Calif.—On page 33 of the February 1966 issue of APPROACH there is a small blurb regarding hi-viz tape of pilots' and crewmembers' helmets. Here's hoping the Helomouse pictured on page 4 of the same issue was scurrying to the nearest parachute loft to get his up-dated.

STOOFMOUSE

Standard Instrument Departures *do not* provide obstruction or terrain clearance

All aviators are reminded that approved Standard Instrument Departures (SIDs) *do not*, and never have, provided for obstruction/terrain clearance.

It is the pilot's responsibility to ensure that his aircraft climb performance will permit compliance with the instructions contained in the selected SID and will assure clearance, by a safe margin, of all ground obstructions encountered along the SID route.

—*Navy Notice to Airmen*

(*Headmouse would like informal reports on near misses of this type for inclusion in an article now being developed—Editor*)

Missing Seat Pins

NAS Brunswick—Recently an F-8 landed at NAS Brunswick for an RON. During rollout the pilot had trouble with his brakes, and after shutdown he determined that the bird would need maintenance.

Since the required parts would have to be shipped in, the F-8 was parked in a hangar to await their arrival. Several days later someone discovered that its ejection seat was still armed!

It isn't hard to imagine what might have happened had a curious individual, a hangar Fire Watch sentry for example, climbed up into the cockpit to take a look and accidently activated the face curtain ejection handle. The result could have been one dead sailor and possibly a damaged aircraft.

In situations where line personnel may not be familiar with their aircraft, pilots should ensure that all safety precautions are taken before leaving the parking area, even, in the case of ejection seats, if it means putting the pins in themselves.

Our crew was capable of putting the pins in but they couldn't find them, and by the time they gave up the search the pilot was gone.

R. E. ERICSON, LT
ASO, NAS BRUNSWICK

• When landing away from home, pilots should ensure that ejection seat pins are properly installed prior to leaving the aircraft. If line personnel do not know how to install the pins, the pilot should install them himself.

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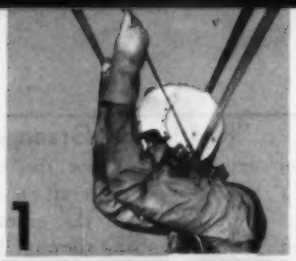

NavWeps 00-75-510

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Cover—S-2 delivering an ASW attack—by Craig Kavafes courtesy Grumman Aircraft Corp., Bethpage, L.I.

Pg. 29, 30 Diagrams courtesy FAA

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"In my judgment, only constant vigilance and strict attention to the exacting demands of night carrier landings will prevent the recurrence of accidents of this type. Positive measures have been taken to ensure that pilots continue to be reminded at frequent intervals of the consequences of making large corrections in close, and of the necessity to initiate an immediate waveoff whenever the meatball is lost late in the approach without attempting to salvage the approach. In addition, it is recommended that LSO's continue to be reminded and encouraged to monitor each carrier pass with an objective eye. Standards should not be altered to match individual pilot capability, more capable pilots must not be burdened by the LSO's expectation that they will somehow salvage their infrequent poor approaches."

—From an AAR